9-1375-213-12

TM 9-1375-213-12

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
(Including Repair Parts and Special Tools List)

DEMOLITION MATERIALS

This copy is a reprint which includes current pages from Changes 1 through 11.

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1973

D 101.11:

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WARNING

Composition C2, C3, and C4 explosives are poisonous and dangerous if chewed or ingested. Their detonation or burning produces poisonous fumes—do not use as a heat source.

TM 9-1375-213-12
C12

Change)
)
No. 12)

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 6 November 1987

OPERATOR'S AND UNIT MAINTENANCE MANUAL
(Including Repair Parts and Special Tools List)
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1-13 and 1-14	1-13 and 1-14
1-23 and 1-24	1-23 and 1-24
1-26.1 and 1-26.2	1-26.1 and 1-26.2
1-27 and 1-28	1-27 and 1-28
2-1 thru 2-4	2-1 thru 2-4
2-37 and 2-38	2-37 and 2-38
C-3 and C-4	C-3 and C-4
Index-1 and Index-2	Index-1 and Index-2

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Change)
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(Including Repair Parts and Special Tools List)
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(Including Repair Parts and Special Tools List)

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B-2 blank	0
C-1 and C-2	0
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Index-1 and Index-2	12
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TECHNICAL MANUAL)
No. 9-1375-213-12)

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *30 March 1973*

TECHNICAL MANUAL OPERATOR'S AND UNIT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS) DEMOLITION MATERIALS

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This manual supersedes TM 9-1375-200, 28 January 1964, including all changes; and together with TM 9-1375-213-34, 30 March 1973 and TM 750-244-5-1, 12 May 1972 supersedes TM 9-1375-203-15, 18 July 1969, including all changes.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual provides the user with operating instructions, operator and organizational maintenance procedures.

b. Refer to FM 5-25 for calculation and placement of charges, and doctrine on demolition projects.

1-2. Forms, Records, and Reports

a. Forms. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Field Report of Accidents. Accidents involving injury to personnel or damage to materiel will be reported on DA Form 285, US Army Accident Investigation Report, in accordance with AR 385-40.

c. Report of Damaged or Improper Shipment. Materiel received in damaged or otherwise unsatisfactory condition because of deficiencies in preservation, packaging, marking, loading, storage, or handling will be reported on SF 364, Report of Discrepancy, in accordance with AR 735-11-2. Reports of improper shipment or damage caused by transportation discrepancies will be reported on SF 361 in accordance with AR 55-38.

d. Malfunctions Involving Explosives.

(1) Ammunition malfunction reports from Army activities will be reported as prescribed in AR 75-1.

(2) A malfunction is the failure of a demolition charge, item or device to function in accordance with the expected performance when fired, or when explosive components function during a nonfunctional test. A critical malfunction is one which may cause a hazard in the circumstances described above. Malfunctions do not include accidents and incidents resulting from negligence, malpractice, or implication in other situations such as vehicle accidents or fires. However, malfunctions do include abnormal or premature function of explosive items during normal handling, maintenance, storage, transportation, and tactical deployment.

(3) If a malfunction involving this material occurs, *firing of the affected lot will be halted immediately.* The commanding officer or senior individual in charge of the unit will immediately contact the officer under whose supervision the ammunition for the unit involved is maintained or issued and will report all available facts concerning the malfunction.

e. Report of Defective or Unsatisfactory Nonexplosive Equipment. Report and turn-in for replacement or repair of non-explosive equipment (e.g., blasting machines, tools, etc.) which is found defective or develops problems in use. Report such equipment by completing SF 368 as prescribed in TM 38-750. Forward completed SF 368, Quality Deficiency Report, to managing activity having managing supply responsibility for the equipment. Managing activity is specified in SC 1375-95-CL-P02.

1-3. Reporting of Errors

Deleted.

1-4. Destruction of Ammunition to Prevent Enemy Use

Destruction of demolition materials when subject to capture or abandonment will be undertaken by the user only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the Army Commander. (Refer to TM 750-244-5-1).

Section II. DESCRIPTION AND DATA

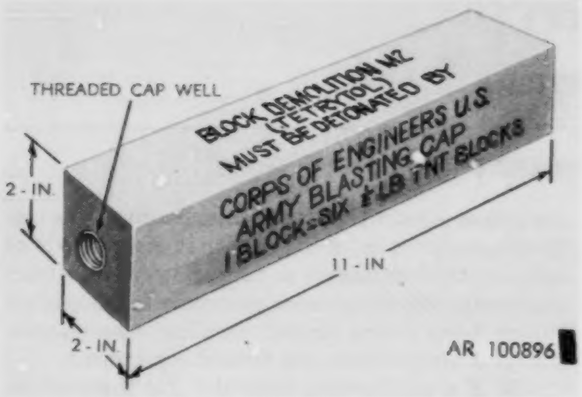

Figure 1-1. Block demolition charge M2.

1-5. General

Demolition materiels described in this section consist of items listed in table 1-1.

1-5A. Color Coding

a. Ammunition is color coded to identify content or functioning. (For example, high-explosive-loaded items are painted olive drab and marked with yellow lettering.)

b. Color coding standards have been altered over the years, one reason being to achieve international standardization. This has resulted in more than one version of an item in the field; e.g., in the case of inert, practice, and training items there are three distinct generations in the field:

(1) The oldest, designated "inert," was painted black. The black color was also used on inert sections (projectiles) of fixed artillery rounds which had live, loaded cartridge cases.

(2) The second generation, designated "training" or "practice," was painted blue. Training items are completely inert and practice items may or may not contain explosive sections such as propellant charges or spotting charges. Practice items containing such explosive sections are indicated by an olive drab band.

(3) The newest generation merely has the inert, training items painted bronze, while practice items are blue, or blue with a brown or yellow stripe.

c. The color of an ammunition item is never to be changed without specific authorization for the items and lot(s) involved. Such authorization will not normally be given to maintenance levels below depots except for non-explosive items.

1-6. General Use—Demolition Charges

(Refer to table 1-2 for additional characteristics.)

a. Charge, Demolition: Block, M2 (2½-Pound).

(1) *Description.* This charge is a block of 75-25 tetrytol with a tetryl booster pellet and a threaded metal cap well cast in each end. Each block is wrapped in olive-drab, asphalt-impregnated paper.

(2) *Uses.* Tetrytol is more powerful and more brisant than TNT and is effective as a cutting or breaching charge. It may be used as an alternate to TNT in general demolition work.

Table 1-1. Demolition Material Data

Description	Model designation	Department of Defense identification code (DODIC)	Color coding
Charge, Demolition:	M2	M036	Olive drab w/yellow markings
	M3	M037	
block	M5A1	M038	White or gray w/black markings
	M112	M023	Gray or olive drab w/yellow markings
	M118	M024	Olive drab w/yellow and black markings
block, TNT:			
¼-pound		M030	Olive drab w/yellow markings (Yellow plastic is an alternate container material for ¼ lb TNT block.)
½-pound		M031	
1-pound		M032	
block, 40-pound, cratering		M039	

Table 1-1. Demolition Material Data Continued

Description	Model designation	Department of Defense identification code (DODIC)	Color coding
roll	M186	M060	Olive drab w/yellow and black markings
shaped	M2A3 and M2A4	M420	Olive drab w/yellow markings
	M3 and M3A1	M421	
Charge Assembly, Demolition:	M183	M757	Olive drab w/black markings
	M37	M756	
Dynamite, Military	M1	M591	Tan w/black markings
Explosive Demolition Accessories: Cap, Blasting: electric	J-2, type II	M130	Unpainted
	M6		

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Table 1-1. Demolition Materiel Data—Continued

Description	Model of designation	Department of Defense identification code (DODIC)	Color coding
Cap, Blasting: nonelectric	J-1	M131	
	M7		
Cord, Detonating		M456	Olive drab or white
Coupling Base, Firing Device		M327	Black, olive drab, or gray
Destructor, Explosive: universal	M10	M241	Olive drab w/yellow or black markings
Destructor, Explosive	M19	M235	Aluminum w/yellow markings
Detonators, Percussion: 15-second delay	M1A2	M450	Olive drab w/yellow markings
8-second delay	M2A1	M448	
Firing Device, Demolition: delay— 6-14 min delay	M1	M616	
12-32 min delay		M619	
45-115 min delay		M620	
100-280 min delay		M621	
210-570 min delay		M622	
610-1,130 min delay		M623	
multipurpose	M142	ML03	
pressure-type	M1 and M1A1	M626	
pressure-release-type	M5	M627	
pull-type	M1	M630	
pull-release-type	M3	M629	
release-type	M1	M631	
Fuse, Blasting, Time: safety		M670	Usually orange
Fuse, Blasting, Time	M700	M670	Olive drab w/yellow markings
Igniter, Time Blasting Fuse: friction-type	M1	M765	
,weatherproof	M2	M766	Olive drab or black w/yellow markings
	M60		Olive drab w/yellow markings
Primer, Percussion: cap	M2 and improved No. 3	M810	
Miscellaneous Demolition Accessories (Nonexplosive):* Adapter, Priming	M1A4		
Adhesive: paste M1			
Adhesive, Charge, Demolition			
Bag, Canvas, Carrying			

Table 1-1. Demolition Materiel Data—Continued

Description	Model designation	Department of Defense identification code (DODIC)	Color coding
Miscellaneous Demolition—Continued			
Blasting Machines			
Box, Blasting Cap			
Cable, Power, Electrical			
Clip, Cord, Detonating	M1		
Chest, Demolition, Engineer: platoon	M1931		
Compound, sealing			
Crimper, Blasting Cap	M2		
Galvonometer, Blasting			
Holder, Blasting Cap	M8		
Knife, Pocket			
Pliers: lineman's			
Reel, Cable			
Reeling Machine, Cable			
Tape, Computing: demolition charge			
Tape, Pressure-Sensitive Adhesive			
Test Set, Blasting Cap	M51		
Twine and Electrical Insulation Tape			
Wire, Electrical			
Demolition Kits and Sets:*			
Demolition Kit, Bangalore Torpedo	M1A1 and M1A2		Olive drab w/yellow markings
Detonator Kit, Concussion	M1	M540	
Demolition Equipment Set, Explosive Initiating, Electric and Nonelectric			
Demolition Equipment Set, Explosive Initiating, Nonelectric			

* These items are not usually assigned model designations. DODIC's and color coding usually do not apply.

Table 1-2. Characteristics of Block and Roll Demolition Charges

Nomenclature	Explosive	Weight	Size (inches)	Relative effectiveness factor (RE)	Packaging and total weight
Charge, Demolition: block (TNT)	TNT	¼ lb	1½ dia x 3½ lg	1.00	200 per wooden box; wt, 79 lb.
		½ lb	1¾ x 1¾ x 3⅝	1.00	96 per wooden box; wt, 65 lb.
		1 lb	1¾ x 1¾ x 8⅝		48, 50, or 56 per wooden box; wt, 80 lb.
Charge, Demolition: block, M2	75/25 tetrytol, w/ tetryl booster	2½ lb	2 x 2 x 11	1.20	8 per haversack, 2 haversack (16 chg) per wooden box; wt, 57 lb.
Charge, Demolition: block, M3	Comp C-2	2¼ lb	2 x 2 x 11	1.34	8 per haversack; 2 haversack (16 chg) per wooden box; wt, 45 lb.
	Comp C-3				
Charge, Demolition: block, M5A1	Comp C-4	2½ lb	2 x 2 x 12	1.34	1 per plastic bag; 24 bags (24 chg) per wooden box; wt, 80 lb.
Charge, Demolition: block, M112	Comp C-4	1¼ lb	1¹⁄₁₆ x 2¹⁄₁₆ x 11¼	1.34	30 per barrier bag (30 chg) per wooden box; wt, 48 lb.
Charge, Demolition: block, M118	PETN or RDX based	Block: 2 lb Sheet: ½ lb	Block: 1¼ x 3¼ x 12½ Sheet: ¼ x 3 x 12	1.14	1 block (4 sheets) per plastic wrapper; 20 blocks per wooden box; wt, 52 lb.
Charge, Demolition: block, 40-pound cratering	Ammonium nitrate with TNT booster	43 lb	7 dia x 24 lg	0.42	1 metal container per wooden box; wt, 52 lb.
Charge, Demolition: roll, M186	PETN or RDX based	25 lb (½ lb per foot)	¼ in. x 3 in. x 50 ft.	1.14	1 roll per canvas bag; 3 bags per wooden box; wt, 115 lb.

(3) *Advantages.* Because of its packaging in haversacks, block demolition charge M2 is well suited for assault demolitions. Tetrytol is only slightly soluble in water and block demolition charge M2 may be used as an underwater demolition charge.

(4) *Limitations.* Tetrytol block charges must have the pure tetryl booster to insure detonation and can therefore be broken into only two pieces. The tetryl booster is more sensitive to impact than tetrytol or TNT and may be detonated by small arms fire. Block demolition charge M2 of tetrytol is brittle and shatters easily if dropped or struck.

b. Charge, Demolition: Block, M3 (2¼-Pound) (fig. 1–2).

(1) *Description.* Block demolition charge M3 is available in either composition C2 or C3. It is enclosed in glazed paper which is perforated around the middle for ease in breaking open. The charge does not have a cap well. Composition C2 or C3 is pliable and may be molded at temperatures between − 20° F. and + 125° F.

(2) *Uses.* Composition C2 or C3 is more powerful than TNT and of about the same sensitivity. Because of their plastic nature and high power, these explosives are suitable for cutting steel or irregular shaped targets, since they may be molded to fit the shape of the target and thus can achieve better contact with resulting high demolition efficiency. Being insoluble in water, block demolition charges of composition C2 or C3 are suitable for underwater demolition, if enclosed in a container or wrapping to prevent erosion by running water.

(3) *Advantages.* These explosives are moldable and may be cut and molded to proper size and shape to fit all targets.

(4) *Limitations.* Below − 20° F., composition C2 or C3 becomes brittle and above + 125° F., exudes some oils and becomes buttery. They emit gases which will cause sickening headaches.

c. Charge, Demolition, Block, M5A1 (2 1/2-Pound) (fig. 1–3).

(1) *Description.* Block demolition charge M5A1 contains composition C4. The charge is encased in a clear plastic container with a threaded cap well in each end. Bulk explosive is obtained by cutting open the plastic container.

(2) *Uses.* Block demolition charge M5A1 is used in almost all types of demolition work, and primarily for cutting and breaching. Because of its moldability and high brisance, composition C4 is ideally suited for steel cutting charges and for cutting irregular shaped targets. Composition C4 is insoluble in water and may be used for underwater demolitions.

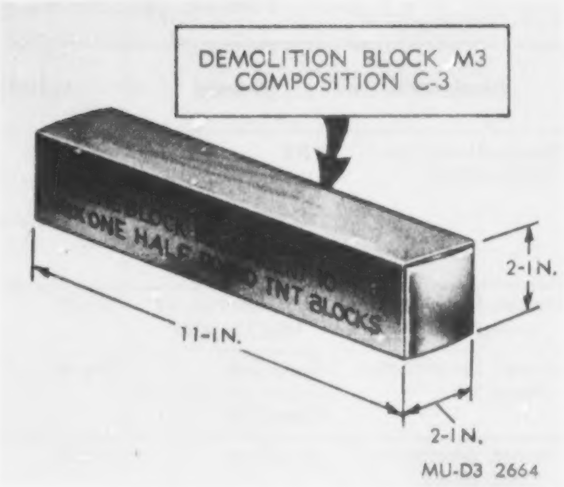


Figure 1–2. Block demolition charge M3.

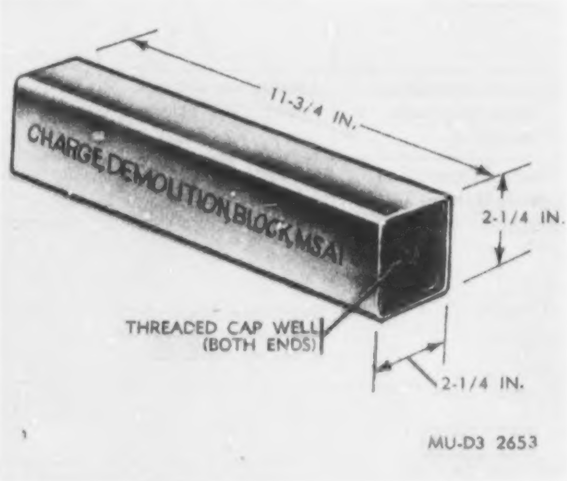

11-3/4 IN.
CHARGE, DEMOLITION, BLOCK, M5A1
2-1/4 IN.
THREADED CAP WELL (BOTH ENDS)
2-1/4 IN.
MU-D3 2653

Figure 1–3. Block demolition charge M5A1.

(3) *Advantages.* Composition C4 is more powerful than composition C3. It is moldable from −20° to +170° F., is more stable, is less sticky, and is less subject to water erosion underwater. Because of its plasticity it may be cut and molded to conform to the shape of the target.

(4) *Limitations.* The white color of composition C4 in block demolition charge M5A1 is diffi-

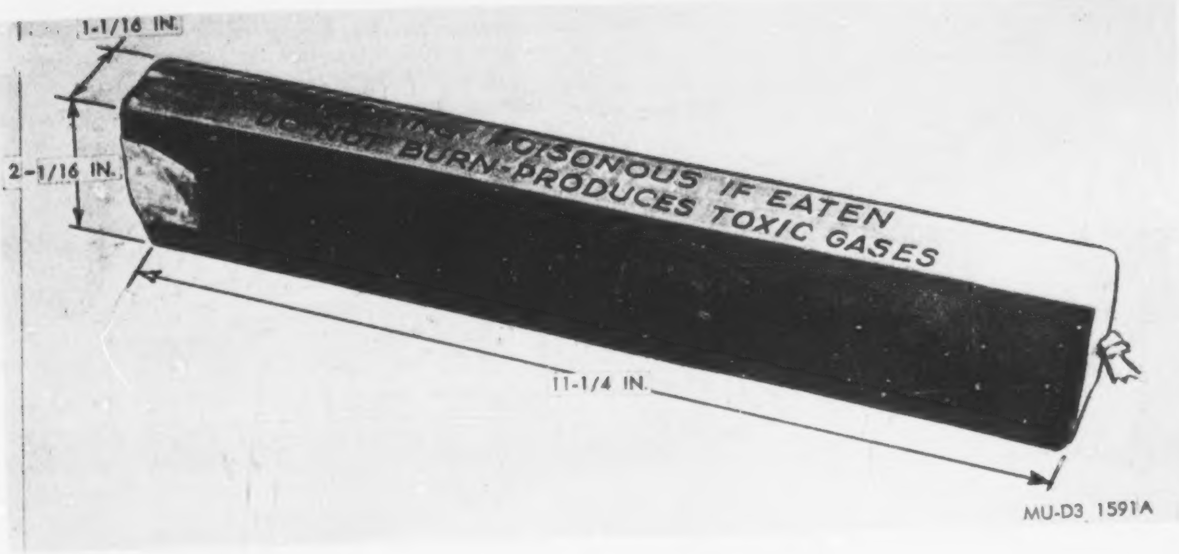


Figure 1-4. Block demolition charge M112.

cult to camouflage. Running water will erode composition C4 if not protected.

d. Charge, Demolition: Block, M112 (*1¼-Pound*) (fig. 1–4).

(1) *Description.* Charge M112 consists of 1¼ pounds of composition C4 packed in a mylar-film bag with pressure-sensitive adhesive tape on one surface for quick emplacement. The tape is protected by a peelable paper cover. Composition C4 in some block demolition charges is colored dull-gray in a clear mylar-film bag. In charges of recent manufacture composition C4 is white and packed in an olive-drab mylar-film bag.

(2) *Uses.* Block demolition charge M112 is used in the same manner as block demolition charge M5A1. This charge is ideally suited for cutting charges as the adhesive backing allows the charge to be attached to any relatively flat, dry surface above freezing (32° F., 0° C.).

(3) *Advantages.* Block demolition charge M112 is of a more efficient shape, and handier size. It is easily attached to the target. It may be cut and molded to fit irregular shaped targets. The color of the wrapper aids in camouflage.

(4) *Limitations.* Odd weight makes calculation of charge weights difficult. Adhesive tape will not adhere to wet surfaces or frozen surfaces.

e. Charge, Demolition: Block, M118 (*2-Pound*) (fig. 1–5).

(1) *Description.* Block demolition charge M118 (commonly called Flex-X or sheet explosive) is a block of four ½-pound sheets of a flexible explosive packed in a plastic envelope. Included in each box of 20 charges M118 is a package of 80 blasting cap holders M8. Each sheet of explosive has a pressure-sensitive adhesive tape attached to one surface.

NOTE

> Exact explosive contained in charges M118 will vary with manufacturer. At present, some manufacturers use PETN as the basic explosive while others use RDX. Charges of future manufacture may include still other explosives.

(2) *Uses.* Block demolition charge M118 is designed for use as a cutting charge, and especially for use against steel targets. The sheets of explosive may be quickly applied to irregular and curved surfaces, and are easily cut to any desired dimensions. Block demolition charge M118 may be used for small breaching charges but should not be used as a bulk explosive charge because of its high cost.

(3) *Advantages.* The flexibility and adhesive backing of the sheets allow them to be rapidly applied to a large variety of targets. The ½-pound sheets may be cut to desired dimensions, and may be applied in layers to achieve desired thickness. It is not affected by water and may be used in underwater demolitions.

(4) *Limitations.* Adhesive tape will not adhere to wet surfaces or frozen surfaces.

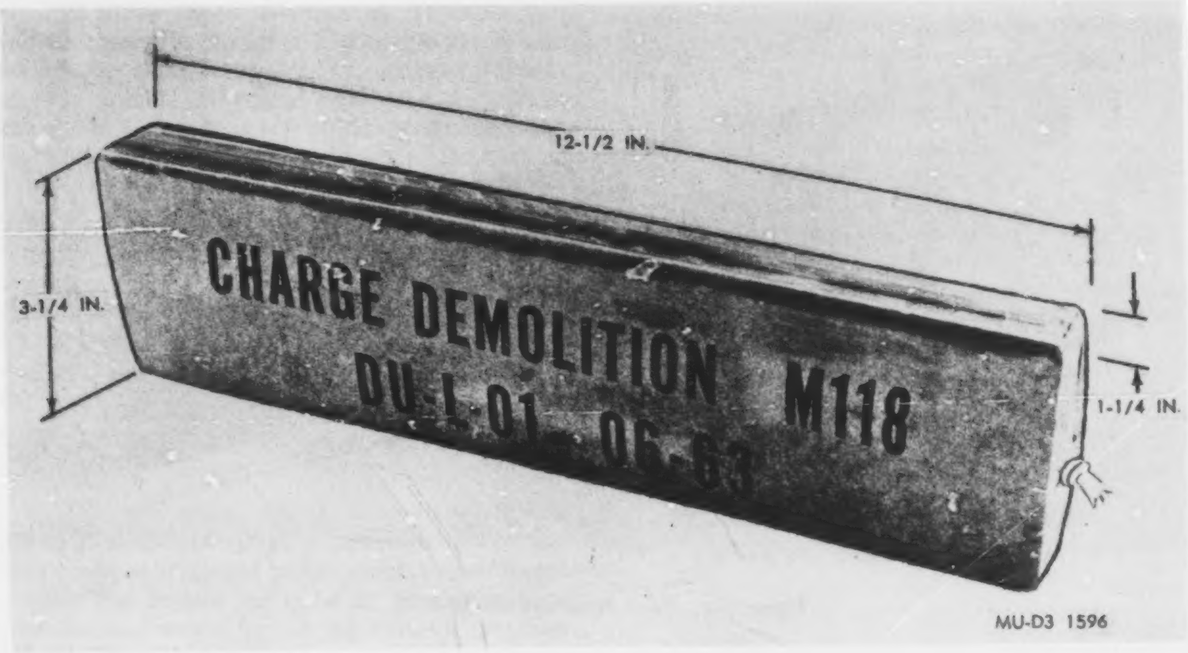


Figure 1-5. Block demolition charge M118.

f. Charge, Demolition: Block (¼-, ½-, and 1-Pound) TNT (fig. 1-6).

(1) *Description.* TNT block demolition charges are issued in three sizes. The ¼-pound block demolition charge is in a cylindrical water-proof cardboard container, and the ½-pound and 1-pound block demolition charges are in rectangular water-proof cardboard containers. All three have metal ends with a threaded cap well in one end. TNT (trinitrotoluene) charges have a high detonating velocity.

(2) *Uses.* TNT block demolition charges are standard demolition charges and are used for all types of demolition work. However, the ¼-pound charge is used primarily for training purposes.

(3) *Advantages.* TNT demolition charges have a high detonating velocity, are stable, are relatively insensitive to shock or friction, and have excellent water resistance. They also have a convenient size, shape, and packaging.

(4) *Limitations.* TNT block demolition charges cannot be molded and are difficult to use on an irregular shaped target. TNT is not recommended for use in closed spaces because its explosion produces poisonous gases.

g. Charge, Demolition: Block (40-Pound) Cratering (fig. 1-7).

(1) *Description.* The 40-pound cratering demolition charge is a watertight cylindrical metal container with approximately 30 pounds of an ammonium nitrate based explosive and a TNT based explosive booster of approximately 10 pounds in the center portion next to the priming tunnels. Two priming tunnels are attached to the outside of the container, midway between the ends. One tunnel serves as a cap well for priming the block demolition charge with an electric or nonelectric military blasting cap. The other tunnel is for priming with detonating cord passed through the tunnel and knotted at the end. A cleat between the tunnels secures time blasting fuse electrical firing wire or detonating cord in place. A metal ring is provided on the top of the container for lowering the charge into the hole.

(2) *Uses.* The ammonium nitrate based explosive has a relatively low detonating velocity and is therefore unsuitable for cutting and breaching operations. However, the blast effect, which is related to pressure of gases produced, gives it a pushing or heaving effect which makes it suited for cratering and ditching operations. The 40-pound cratering block demolition charge has been designed as a standard cratering charge. Because of the large amount of explosive in convenient form, it may also be used in destroying buildings and fortifications and overturning bridge abutments.

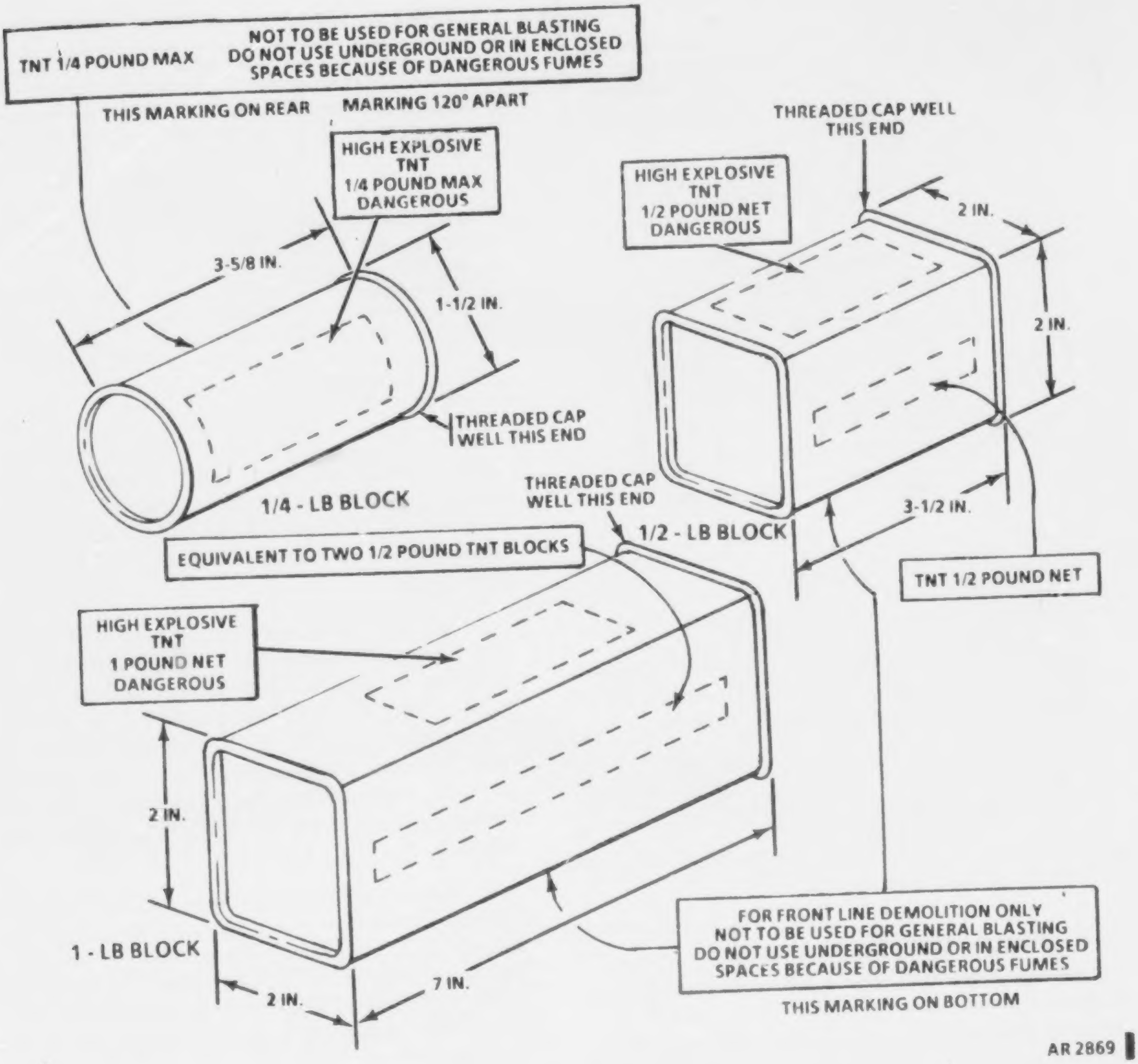

TNT 1/4 POUND MAX
NOT TO BE USED FOR GENERAL BLASTING
DO NOT USE UNDERGROUND OR IN ENCLOSED SPACES BECAUSE OF DANGEROUS FUMES
THIS MARKING ON REAR
MARKING 120° APART
HIGH EXPLOSIVE TNT 1/4 POUND MAX DANGEROUS
3-5/8 IN.
1-1/2 IN.
THREADED CAP WELL THIS END
1/4 - LB BLOCK
THREADED CAP WELL THIS END
HIGH EXPLOSIVE TNT 1/2 POUND NET DANGEROUS
2 IN.
2 IN.
3-1/2 IN.
1/2 - LB BLOCK
TNT 1/2 POUND NET
THREADED CAP WELL THIS END
EQUIVALENT TO TWO 1/2 POUND TNT BLOCKS
HIGH EXPLOSIVE TNT 1 POUND NET DANGEROUS
2 IN.
1 - LB BLOCK
2 IN.
7 IN.
FOR FRONT LINE DEMOLITION ONLY
NOT TO BE USED FOR GENERAL BLASTING
DO NOT USE UNDERGROUND OR IN ENCLOSED SPACES BECAUSE OF DANGEROUS FUMES
THIS MARKING ON BOTTOM
AR 2869

Figure 1–6. TNT block demolition charges.

(3) *Advantages.* The size and shape of the charge make it ideal for cratering operations. It is very inexpensive to produce compared to other explosives.

(4) *Limitations* Ammonium nitrate readily absorbs moisture thereby becoming more difficult to initiate and less effective. It is not possible to detonate wet ammonium nitrate. To insure detonation, the metal containers must be inspected for any evidence of water damage, and all charges placed in wet or damp boreholes should be detonated as soon as possible. Ammonium nitrate cratering charges should be dual primed.

1–7. Charge, Demolition: Roll, M186
(fig. 1–8).

a. Description. Roll demolition charge M186 is identical to charge M118 except that the explosive is in the form of a 50-foot roll on a plastic spool, rather than in sheet form. Each foot of the roll provides approximately ½ pound of explosive. Included with each roll are 15 blasting cap holders M8 and a canvas bag with carrying strap. For explosive content see note in 1–6*e*(1).

b. Uses. Roll demolition charge M186 is used in the same manner as block demolition charge M118

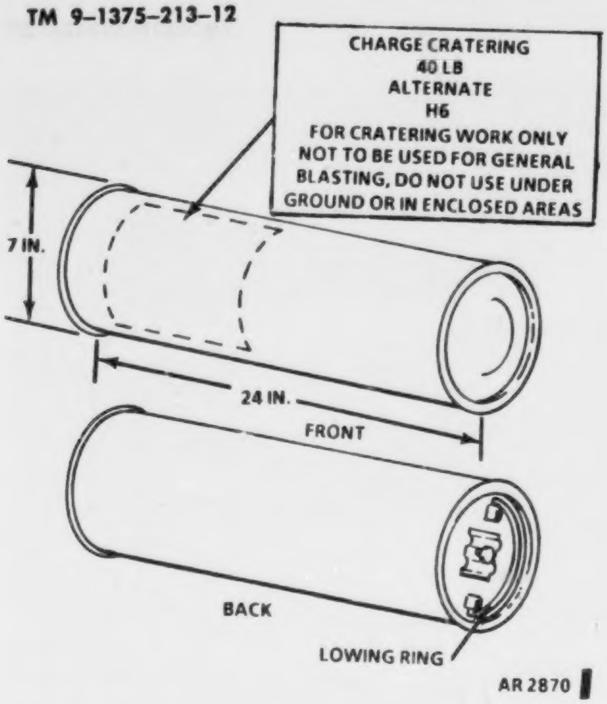


Figure 1-7. 40-pound cratering demolition charge.

(para 1-6*e*(2)). Charge M186 is especially adaptable for demolishing targets which require use of flexible explosive in lengths longer than 12 inches.

c. Advantages. Roll demolition charge M186 has all the advantages of the charge M118. Charge M186 may be cut to exact lengths desired.

d. Limitations. The adhesive backing will not adhere to wet or frozen surfaces.

1-8. Charge, Demolition: Shaped

(Refer to table 1-3 for additional characteristics.)

Shaped demolition charges used in military demolition operations are tapered round blocks of high explosive having a lined, conical cavity in one end which directs the cone liner material into a narrow jet for penetrating metal, concrete, earth or other materials. Maximum penetration is obtained when the charge is exploded at a specific distance from the target, called *standoff*. A standoff distance is provided by a fiber sleeve or metal legs supporting the charge. A carrying handle is attached to each charge. Shaped demolition charges are used primarily to bore holes in earth, metal, masonry, concrete, and paved and unpaved roads.

a. Charge, Demolition: Shaped (15-Pound) M2A3 (fig. 1-9). Shaped demolition charge M2A3 contains approximately 9½ pounds of composition B with a 50-50 pentolite booster weighing approximately 2 pounds in a moisture-resisting molded fiber container. Older models are completely pentolite loaded. A cylindrical fiber base slips on end of charge to provide a stand-off distance. A cone of glass is used as a cavity liner in this charge.

Table 1-3. Characteristics of Shaped Demolition Charges

Type	Size (inches)	Packaging
Charge, Demolition: shaped, 15-lb, M2A3	7¾ dia x 16¼ lg w/fiberboard standoff	1 per waterproof carton; 3 per wooden box; 65 lb.
Charge, Demolition: shaped, 15-lb, M2A4		3 per wooden box; 65 lb.
Charge, Demolition: shaped, 40-lb, M3	10⅞ dia x 29 lg w/standoff	1 charge per wooden box; 65 lb.
Charge, Demolition: shaped, 40-lb, M3A1		

b. Charge, Demolition: Shaped (15-Pound) M2A4. Shaped demolition charge M2A4 is less sensitive to gunfire than charge M2A3. Charge M2A4 is identical to charge M2A3 in performance, except that the 50-50 pentolite booster has been replaced by 50 grams of composition A3. Also, the main charge of composition B has been increased to maintain same total weight as charge M2A3.

c. Charge, Demolition: Shaped (40-Pound) M3. Shaped demolition M3 charge contains approximately 28.3 pounds of composition B with 1.7-pound booster of 50-50 pentolite in a metal container. The cavity liner is made of metal. A metal tripod for obtaining a standoff distance is also provided.

d. Charge, Demolition: Shaped (40-Pound) M3A1 (fig. 1-10). Shaped demolition charge M3A1 is less sensitive to gunfire than charge M3. Charge M3A1 is identical to charge M3 in performance, except that the 50-50 pentolite booster has been replaced by a booster of approximately 50 grams of composition A3. Also the main charge of composition B has been increased to maintain the same total weight as charge M3.

e. Charge, Demolition Mk 74, Mod 1 Shaped (fig. 1-10a). Small specialized shaped charge used by EOD personnel.

1-9. Charge Assembly, Demolition

a. Charge Assembly, Demolition: M183 (fig. 1-11). Demolition charge assembly M183 consists of 16 block demolition charges M112 (comp C4),

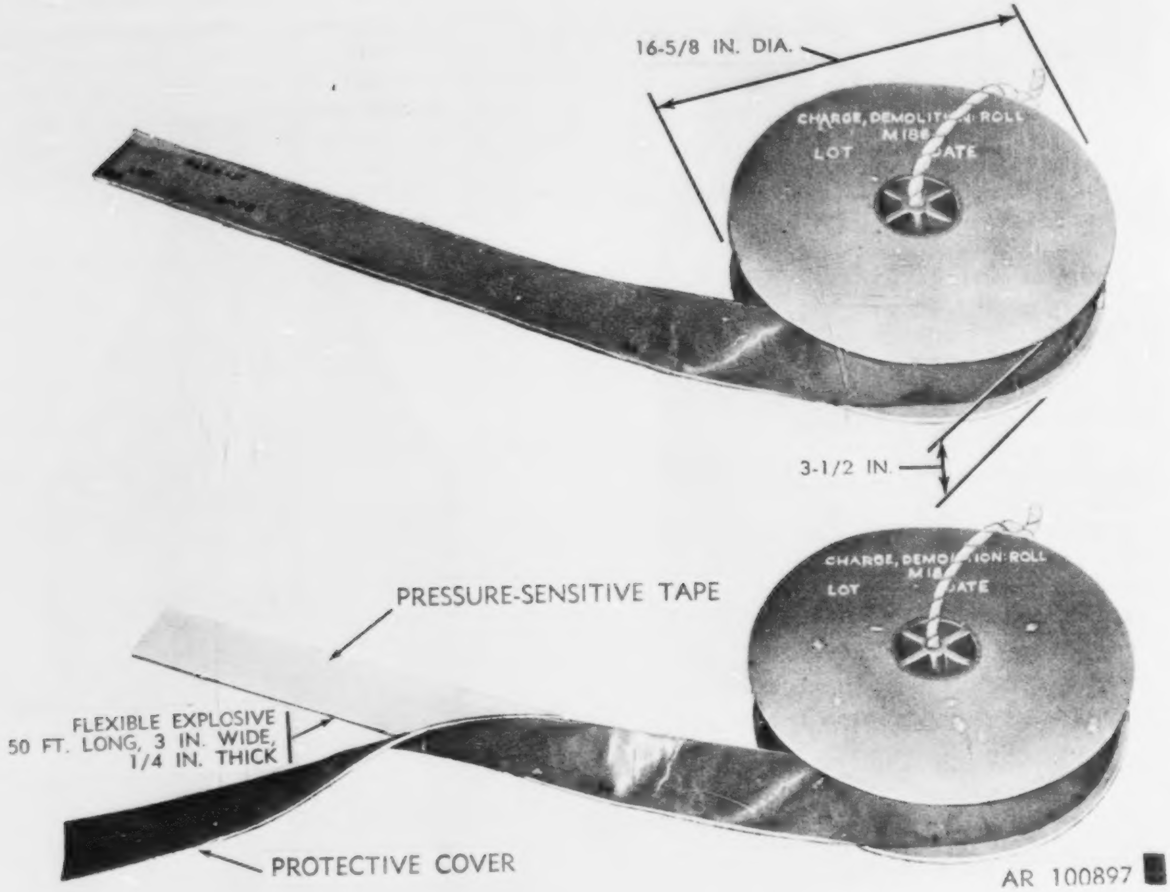

16-5/8 IN. DIA.
CHARGE, DEMOLITION ROLL M186
LOT
DATE
3-1/2 IN.
PRESSURE-SENSITIVE TAPE
FLEXIBLE EXPLOSIVE 50 FT. LONG, 3 IN. WIDE, 1/4 IN. THICK
PROTECTIVE COVER
AR 100897

Figure 1-8. Roll demolition charge M186.

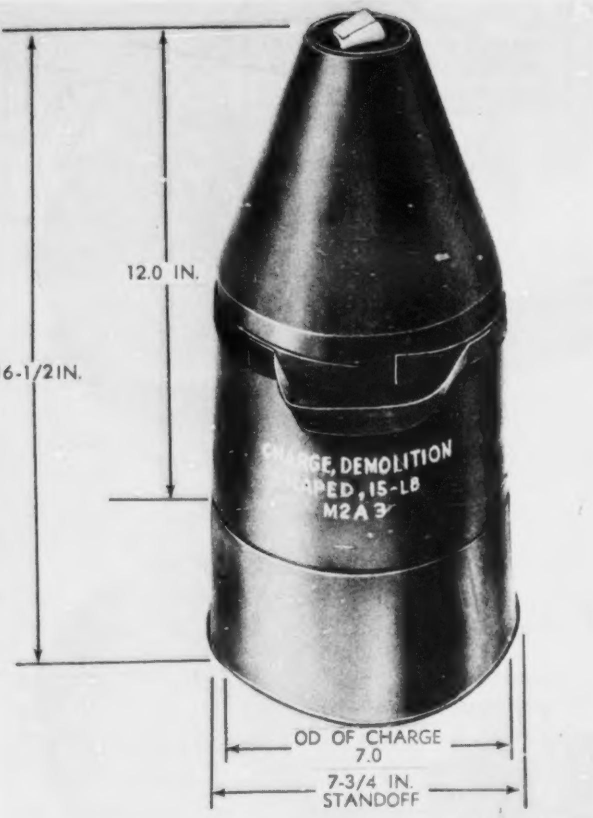
and four priming assemblies. Total explosive weight is 20 pounds. Each priming assembly consists of a 5-foot length of detonating cord with an RDX booster crimped to each end, and a pair of detonating cord clips M1 for attaching priming assembly to a detonating cord main line. The demolition charge assembly is used primarily in breaching obstacles or demolition of large structures where large charges are required. Block demolition charges are packed in two bags, eight block demolition charges per bag, and placed in a canvas carrying case M85. One assembly is packed in the canvas carrying bag and two bags are packed in a wooden box. The gross package weight is 57 pounds.

b. Charge Assembly, Demolition: M37 (fig. 1-12). Demolition charge assembly M37 consists of eight block demolition charges M5A1 (comp C4) and two priming assemblies M15. The total explosive weight is 20 pounds. Each priming assembly has two priming adapters M4A1 for attaching boosters into charges. The block demolition charges are packed in two bags, four block demolition charges per bag and placed in a canvas carrying case M85. One assembly is packed in the canvas carrying case and two carrying cases are packed in a wooden box. The gross package weight is 57 pounds. As stock is depleted, this charge assembly will be replaced by demolition charge assembly M183 (*a* above).

1-10. Dynamite: Military, M1

a. Description. Military dynamite M1 (fig. 1-13) is an RDX based composite explosive. It is safer to store, handle, and transport than commercial dynamite because it contains no nitroglycerine. Military dynamite M1 is packaged in ½-pound, paraffin-coated, cylindrical paper cartridges. As compared with TNT, the relative effectiveness (RE) factor of military dynamite M1 is 0.92. Fifty sticks of dynamite are packed per waterproof bag, two bags per wooden box, or 65 sticks of dynamit per carton, two cartons per wooden box.

b. Uses. Military dynamite M1 is for general use



AR 100898

Figure 1-9. Shaped demolition charge M2A3.

as medium velocity blasting explosive to replace 60-percent commercial dynamites in military construction, quarrying, ditching, and service demolition work. It is suitable for underwater demolitions.

c. Advantages. Military dynamite M1 will not freeze in cold storage, nor exude in hot storage. The composition does not absorb or retain moisture. Shipping containers do not require turning in storage. Safety in transportation, storage, and handling is better than that of 60-percent commercial dynamite. It may be used in combat areas.

d. Limitations. It is reliable underwater only up to 24 hours. Because of its low sensitivity, sticks of military dynamite M1 must be well compacted to assure complete detonation of the entire charge, e.g., there must be no voids in loading of boreholes in quarrying. This characteristic, combined with the fact that military dynamite will eventually detonate if set afire in a confined space, can result in a secondary explosion from a bore-hole with a void in its loading. It may take up to 15 minutes for such an explosion to occur after the first blast. Because of its medium velocity and cylindrical shape, it is no efficient as a cutting or breaching charge.

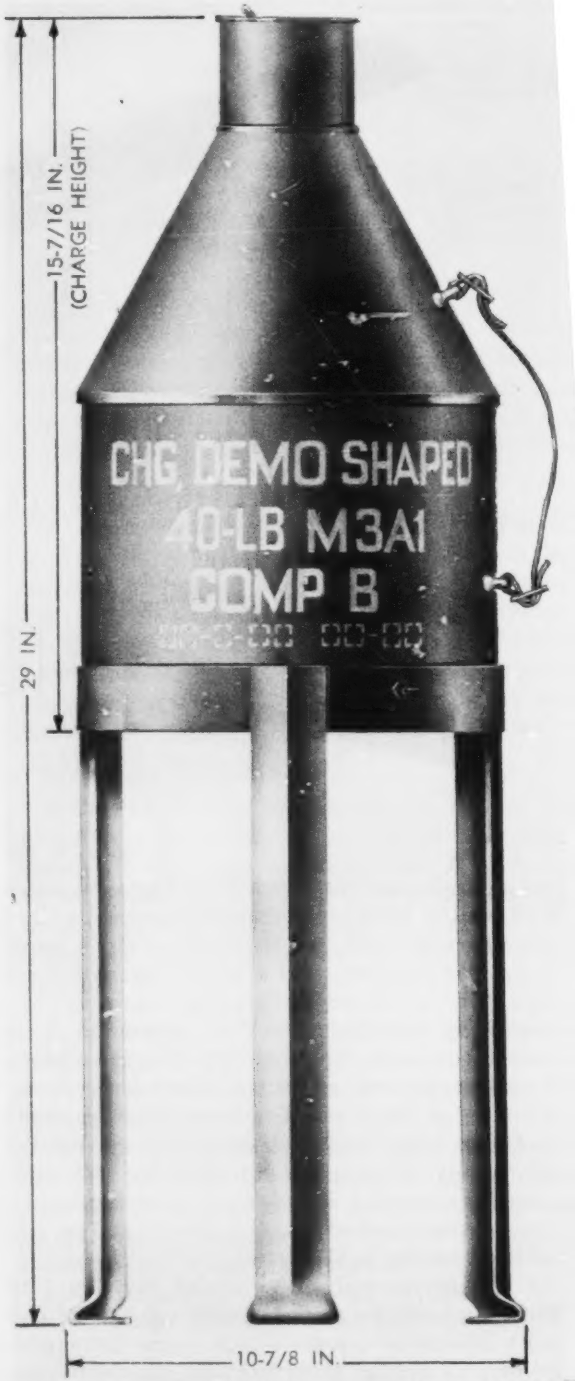


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Figure 1-10. Shaped demolition charge M3A1.

1-11. Explosive Demolition Accessories

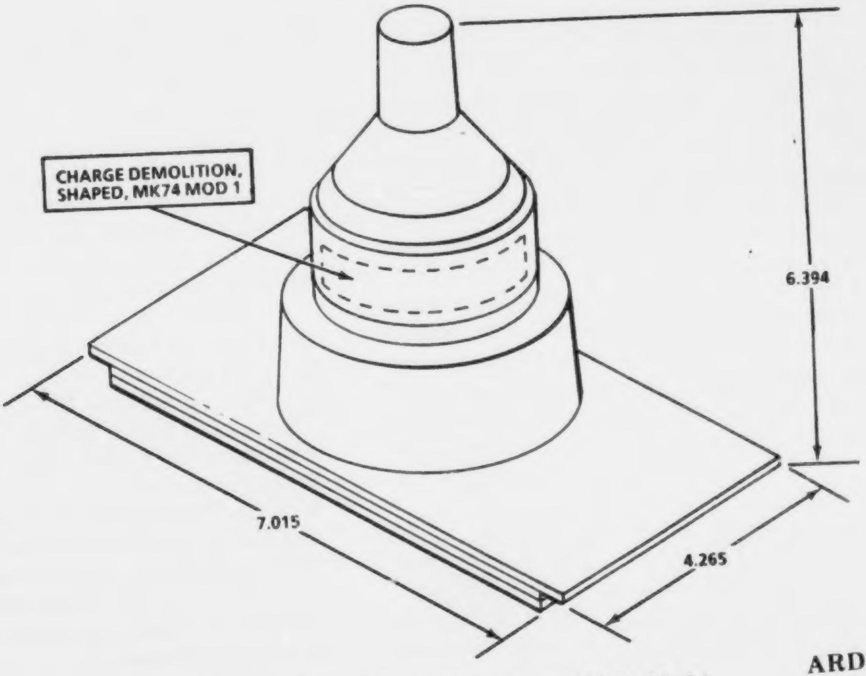
a. Caps, Blasting. Blasting caps are the main elements used to initiate high explosive. They function by translating a small signal, either a flame or a pulse of electricity, into a detonation wave. They are classified by type of ignition and strength. Military electric blasting caps are instantaneous ignition. Commercial electric blasting caps can be delay or instantaneous ignition. No. 8 strength delay caps are normally used since they are compatible with military dynamite. Delay caps are used primarily in quarrying, tunneling, and making relief-faced craters. The blasting caps listed below (both electric and non-electric) are recognized as interchangeable within NATO. The recognized NATO term for *blasting cap is detonator*.

Detonator	*Country of origin*
Cap, blasting, electric, M6	US
Cap, blasting, nonelectric, M7	US
Electric detonator	Italy
Nonelectric detonator E T 4	Italy
Detonator No. 1	Netherlands
Ordinary PRB detonator	Belgium
BRISKA detonator	France
DM 11 detonator	Germany

(1) *Caps, blasting: electric*.

(*a*) *Description*. Electric blasting caps (fig. 1-14) are available with various lead wire lengths, the most common being 12 feet. Lead wires are shorted by being twisted together or by being crimped in a shunting tube to prevent accidental initiation by static electricity. Electric blasting caps require a minimum of half an ampere of electricity passing through their wires for ignition. The military M6 cap require 1.5 amperes for reliability. Misfires can result from mixing electric caps of different characteristics in a series circuit—one type cap fires before the others, breaking the circuit before the others have been given enough electrical energy to fire. With the exception of the M6 cap, electrical characteristics of caps can vary greatly, even from lot to lot made by one manufacturer. For this reason, different type commercial caps and even different lots of the same type made by the same manufacturer should never be put together in a blasting circuit.

(*b*) *Cap, blasting: electric, M6*. Electric blasting cap M6, an instantaneous-ignition, No. 12 strength cap, is the standard Army electric blasting cap. It initiates any standard demolition charge. Blasting caps M6 are electrically uniform. For this reason any lot of M6 caps may be mixed with any other lot of M6 caps in a blasting circuit without fear of misfires resulting from different characteristics. Electric blasting cap M6 is replacing electric blasting cap J-2. Electric blasting caps M6 are packed 6 caps per carton, 1 carton per waterproof bag, 25 bags per fiberboard container, 6 containers (900 caps) per waterproof lined wooden box. The weight of the box with contents is 114 pounds.



ARD-2728

Figure 1-10a. Shaped demolition charge Mk74, Mod 1

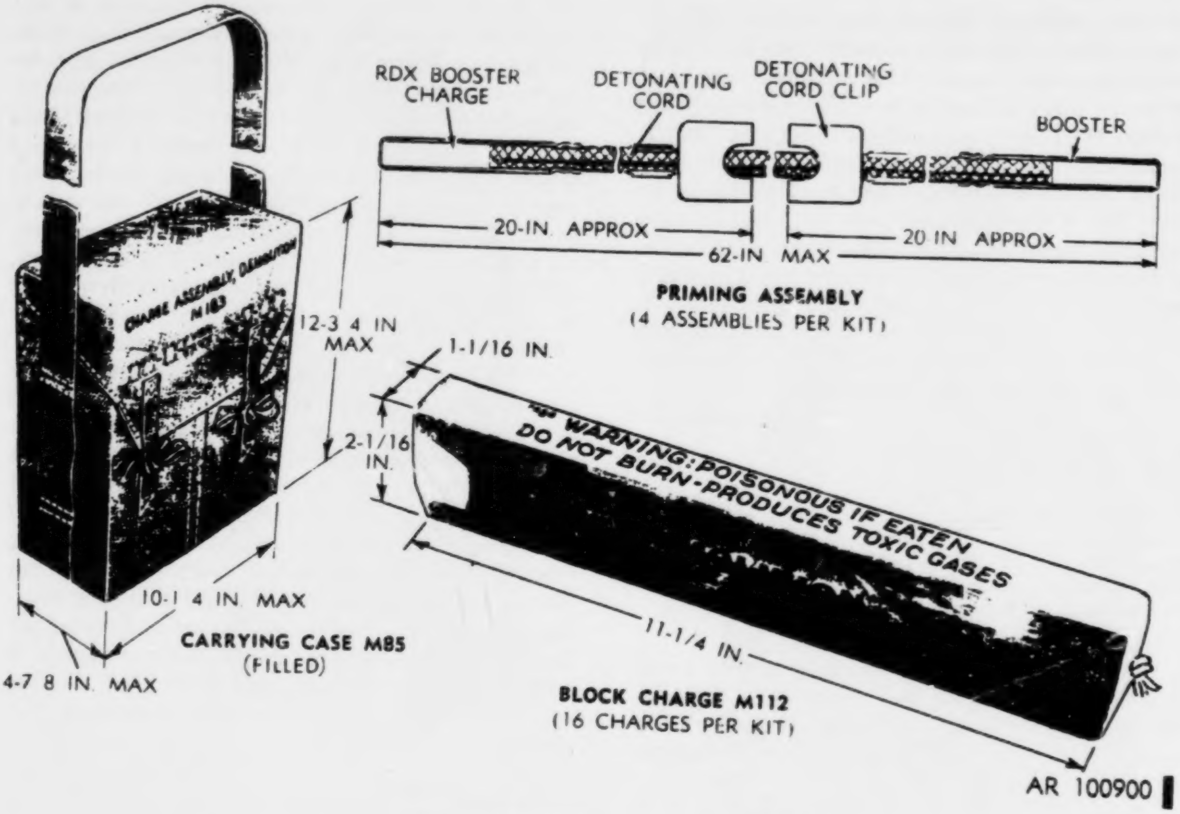


Figure 1-14. Demolition charge assembly M183.

(2) *Caps, blasting: nonelectric.*

(*a*) *Description.* Nonelectric blasting caps initiate any standard demolition charge. Nonelectric blasting caps (fig. 1-15) require only a small spit of flame or a shock on their igniter charge (within the cup) for ignition. A time blasting fuse or the primer in a firing device coupling base may provide the flame. The shock may be provided by a detonating cord which is initiated by another cap.

(*b*) *Cap, blasting: nonelectric, M7.* The standard Army nonelectric blasting cap is the M7. The open end of M7's cup is flared to make insertion of fuse or coupling base nipple easier. Nonelectric blasting cap M7 replaced the older J-1 cap. Nonelectric blasting caps M7 are packed 6 caps per carton, 1 carton per waterproof bag, 50 bags per fiberboard container, 12 containers (3,600 caps) per wooden box.

b. Cord, Detonating. Detonating cord (fig. 1-16) consists of a core of PETN in a textile tube coated with a thin layer of asphalt. On top of this is an outer textile cover finished with a wax gum or plastic coating. One hundred feet of detonating cord is wound per spool and 50 spools (5,000 ft) are packed in a wooden box. Five hundred feet of detonating cord is wound per spool, 1 spool is sealed per can, 8 cans (4,000 ft) per wooden box. The weight of the box with contents is 117 pounds. One thousand feet of detonating cord wound on a spool is packed in a cardboard box and sealed in a barrier bag. Detonating cord is used to prime and detonate other explosive charges. Detonating cord used alone functions as an explosive charge.

c. Coupling Base, Firing Device. Firing device coupling base (see f below) is a knurled metal coupling containing a percussion primer, improved M3. A blasting cap can be attached to the nipple of the coupling base. The coupling base is threaded at one end to screw into a standard firing mechanism and at the other to screw into a cap well of a demolition charge or certain types of mines. The coupling base may be reused for training and test purposes if the expended primer is replaced. Fifty firing device coupling bases are packed in a waterproof carton, 10 cartons (500 coupling bases) per wooden box. The weight of the box with contents is approximately 35 pounds.

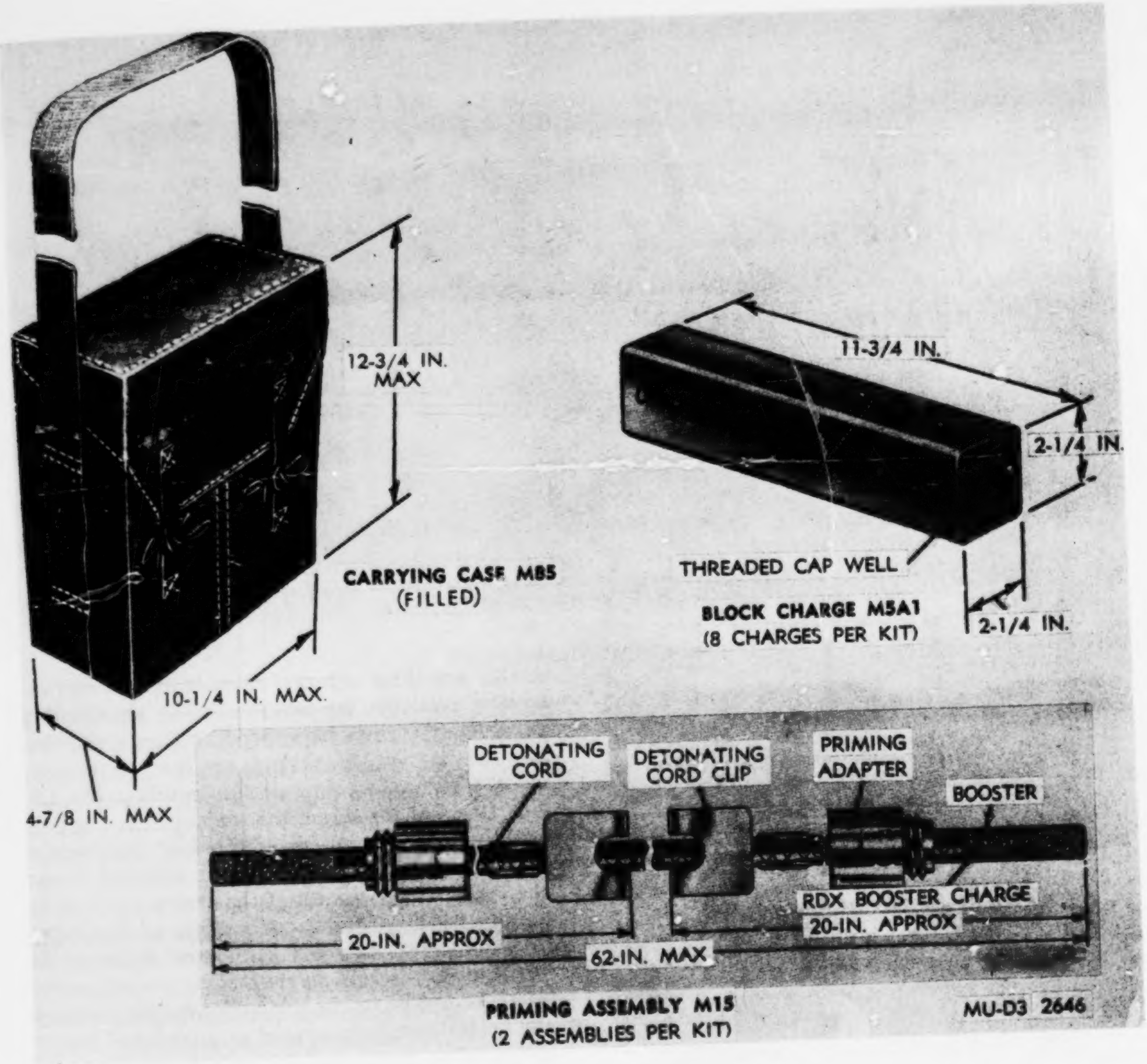


Figure 1–12. Demolition charge assembly M37.

d. Destructor, Explosive.

(1) *Destructor, explosive, universal, M10* (fig. 1–17). Universal explosive destructor M10 is a tubular sheet steel roll threaded assembly consisting of:

(*a*) *Closing plug and cork gasket.* The plastic closing plug and cork gasket are used to keep the destructor sealed during shipment, storage, and handling preparatory to use.

(*b*) *Blasting cap bushing.* The bushing is threaded to receive a priming adapter or any issue firing device.

(*c*) *Activator bushing with felt washer.* This bushing is threaded to receive mine activator M1 or M2.

(*d*) *Booster assembly.* This assembly consists of two identical externally and internally threaded booster cups screwed together. The cup to which the activator bushing is attached contains three cylindrical tetryl pellets with central holes which allow for the insertion, without interference, of either a blasting cap or an activator. The other cup contains cylindrical tetryl pellets (without central holes) and a felt pad.

(*e*) *Ammunition bushing.* This bushing is a hexagonal-edged steel collar with two different

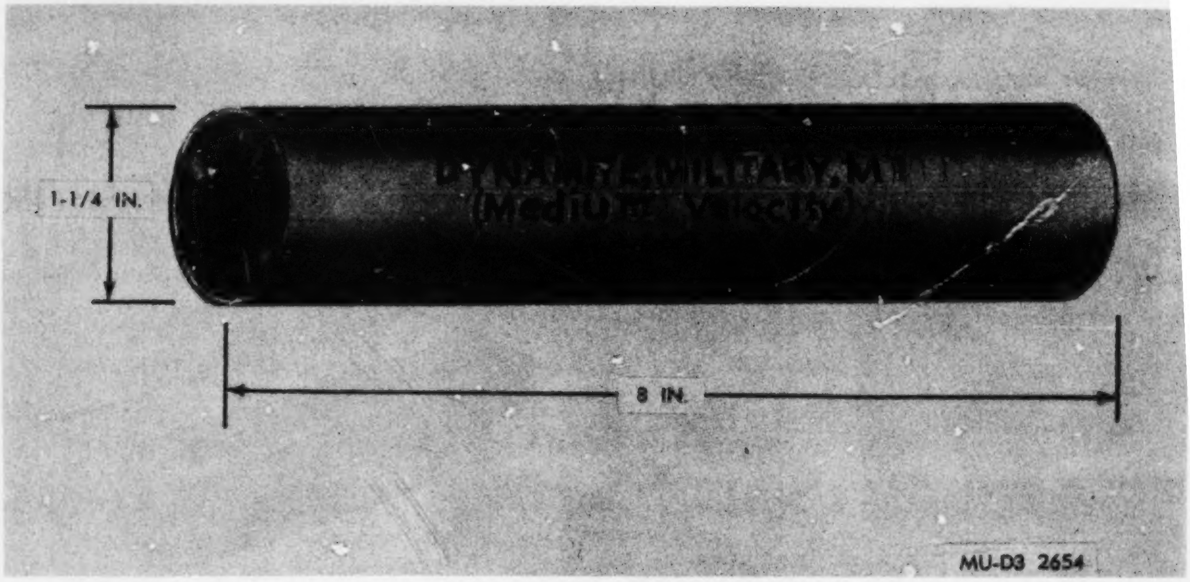


Figure 1-13. Military dynamite M1.

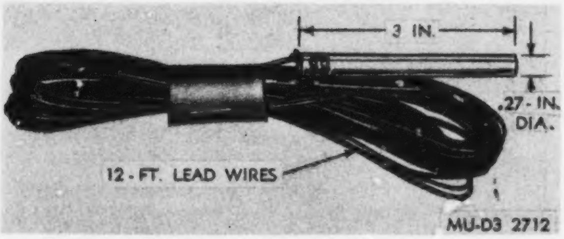


Figure 1-14. Electric blasting cap.

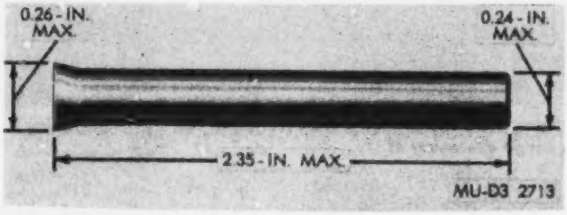


Figure 1-15. Nonelectric blasting cap.

size external threads. The 1.5-inch diameter internal thread fits the external thread of the booster cups and adapts the destructor for use with any ammunition having 1.7-inch or 2-inch diameter right-hand-threaded fuze cavities. This destructor is initiated by means of a standard military blasting cap as a firing device with blasting cap, or by a firing device and antitank mine activator M1 or M2 (practice antitank mine activator M1 cannot be used with this destructor). The destructor assembly has three external threads of different diameter available for attachment to ammunition items having three corresponding fuze well sizes. These three available threads are the 2-inch external thread on the ammunition bushing, the 1.7-inch external thread on the ammunition bushing, and the 1.5-inch external thread of the booster cup. Thus, there is a proper size external thread available for attachment of the destructor to artillery projectiles, bombs, and rockets having corresponding size fuze wells. Universal explosive destructor M10 is used in converting loaded projectiles and bombs to improvised demolition charges and to destruct deteriorated or abandoned ammunition. One destructor is packed per fiber container, 50 containers (50 destructors) per wooden box. The weight of the box with contents is approximately 80 pounds.

(2) *Destructor, explosive: M19* (fig. 1-18). The explosive destructor M19 consists of an explosive-filled, cylindrical body with a removable ogive which may be discarded if not needed for a particular operation. This destructor is primed with a standard military blasting cap, a delay detonator, a delay firing device with a high output blasting cap, a nonelectric high output blasting cap initiated by time blasting fuse or detonating cord, or an electric high output blasting cap. The cap well on each end is threaded to receive standard base coupling or priming adapter. This device is particularly suitable for use as a dust initiator

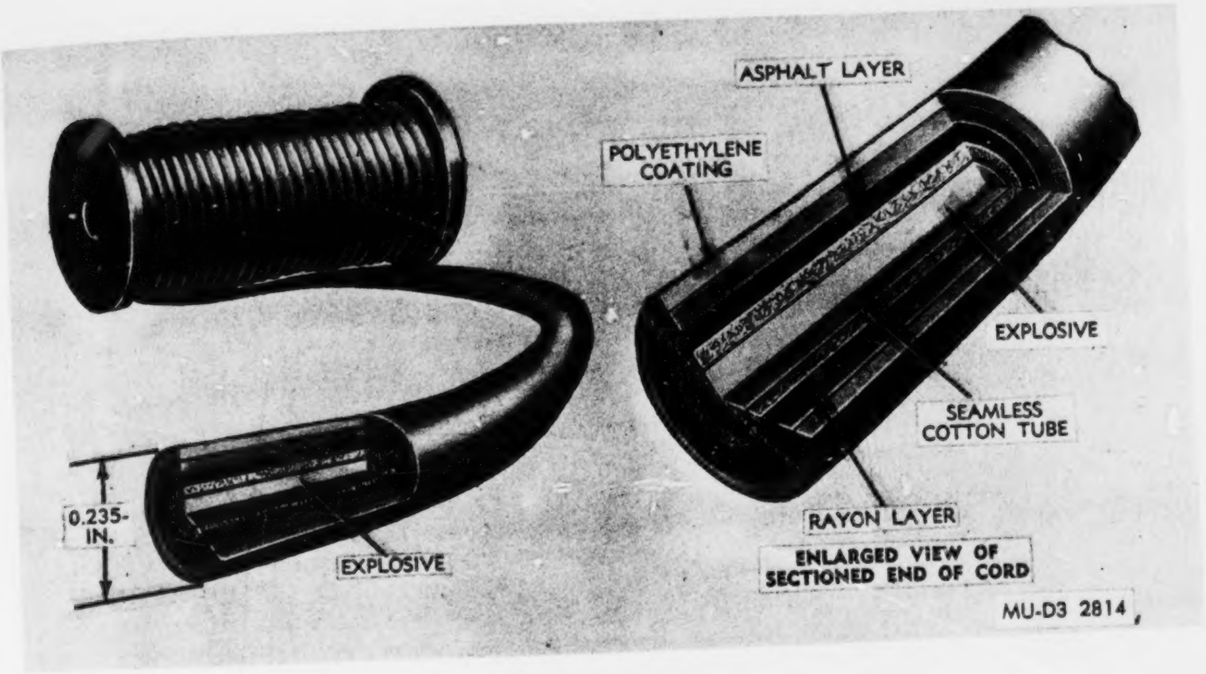


Figure 1-16. Detonating cord.

in an enclosed space (boxcar or unventilated warehouse) containing powdered dust such as coal, flour, soap, aluminum, or magnesium powders.

e. Detonators. Detonators are mechanically actuated explosive devices and are used to detonate explosive charges. Detonators combine the functions of firing devices and blasting caps in a single unit. They may or may not incorporate a time-delay mechanism. Detonators used in demolition work are classified according to the initiating action as percussion, and concussion.

(1) *Detonators, percussion delay.* Delay percussion detonators are devices for detonating explosive charges after a definite period of delay. The initiating mechanism, delay system, and blasting cap are all integral parts of the unit. These detonators are used for short delay firing of demolition charges, particularly during assault demolitions. They are suitable for underwater use.

(2) *Detonator, percussion: M1A2, 15-second delay* (fig. 1–19). Fifteen second delay percussion detonator M1A2 consists of a firing pin assembly joined to a delay housing and primer holder assembly, with a special blasting cap crimped to an integral coupling base on one end of the delay housing and primer holder assembly. The 15-second delay percussion detonator may be distinguished from the 8-second delay percussion detonator ((3) below) by the markings on the surface of the delay housings and by the shapes of the pull rings. The 15-second delay percussion detonator has a circular pull ring. Twenty-five 15-second delay percussion detonators M1A2 are packed per carton, 8 cartons (200 detonators) per wooden box or 10 detonators per carton, 1 carton per barrier bag, 5 bags per carton, 4 cartons (200 detonators) per wooden box. The weight of the box with contents is 75 pounds.

(3) *Detonator, percussion: M2A1, 8-second delay* (fig. 1–20). Except for the delay period, marking, and the shape of the pull ring, the 8-second delay percussion detonator is identical in construction, functioning, and use to the 15-second delay percussion detonator described in (2) above. The 8-second delay percussion detonator may be distinguished from the 15-second delay percussion detonator by the markings on the delay housings and by the shapes of the pull rings. The 8-second delay percussion detonator has a T-shaped pull ring. Ten 8-second delay percussion detonators M2A1 are packed per barrier bag, 5 bags per carton, 4 cartons (200 detonators) per wooden box. The weight of the box with contents is 75 pounds.

f. Firing Devices. A firing device is designed to

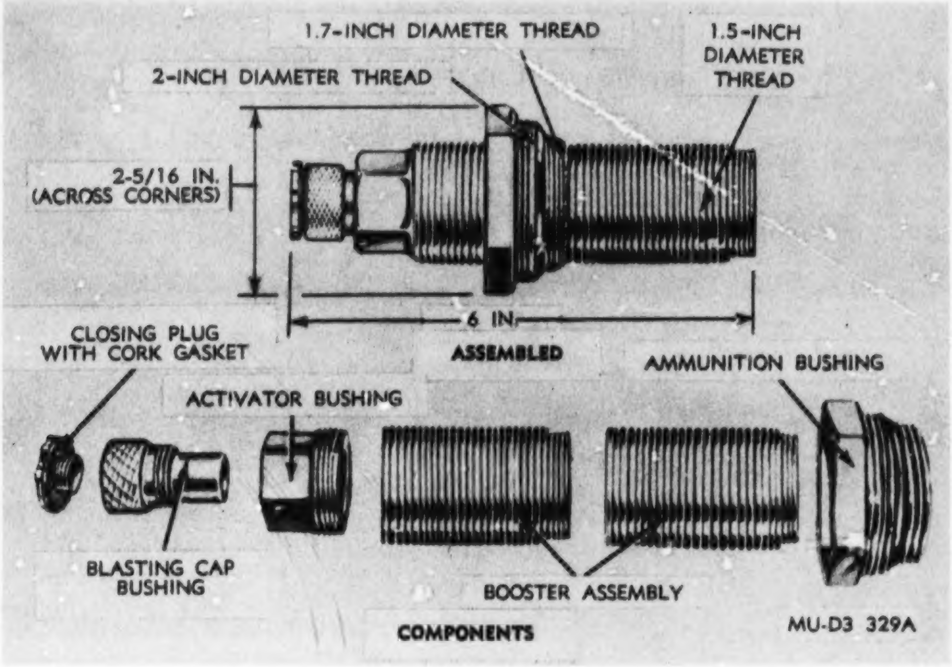


Figure 1-17. Universal explosive destructor M10.

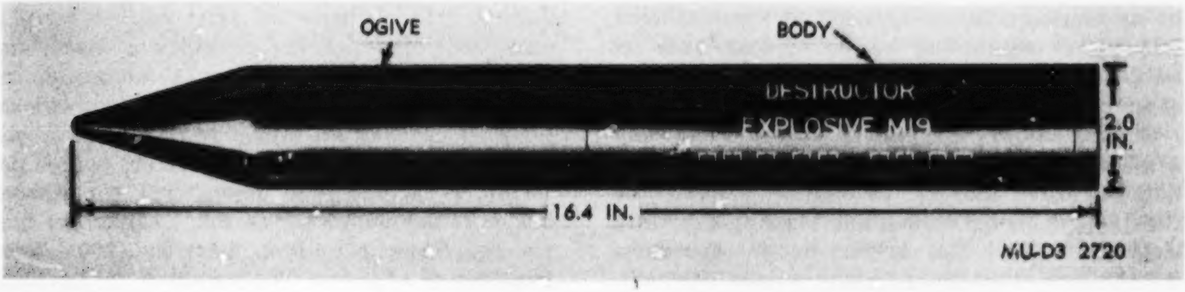


Figure 1-18. Explosive destructor M19.

initiate a train of fire or detonation of demolition charges, boobytraps, or mines, principally by action on a nonelectric blasting cap or mine activator. It is a separate item of issue. Firing devices are of two general types, the tubular type and the box type. The tubular-type firing devices, consisting of head, case, and coupling base, are arranged for actuation by pressure, pull, or release of pull according to the design of the particular model. The box-type firing devices, consisting of a rectangular steel body and coupling base, are arranged for release of pressure. The coupling base, fitted to all types, contains a percussion primer.

(1) *Firing device, demolition*: *M1, delay-type* (fig. 1-21). Delay-type demolition firing device M1 is a chemically-timed mechanical device used for delay action firing of mines or demolition charges. The device consists of a two-part case or tube, the parts being joined near the center by a coupling. The tube is about 3/8 inch in diameter and the device is 6¼-inches long including a primed coupling base, which is not removable, but has the same size thread and nipple as on all removable firing device coupling bases. The half of the case attached to the coupling base is brass and the other half is thin copper, capable of being crushed between thumb and finger. The copper half contains a sealed glass ampoule of corrosive chemical and the brass half houses a firing pin and spring. An identification and safety strip ex-

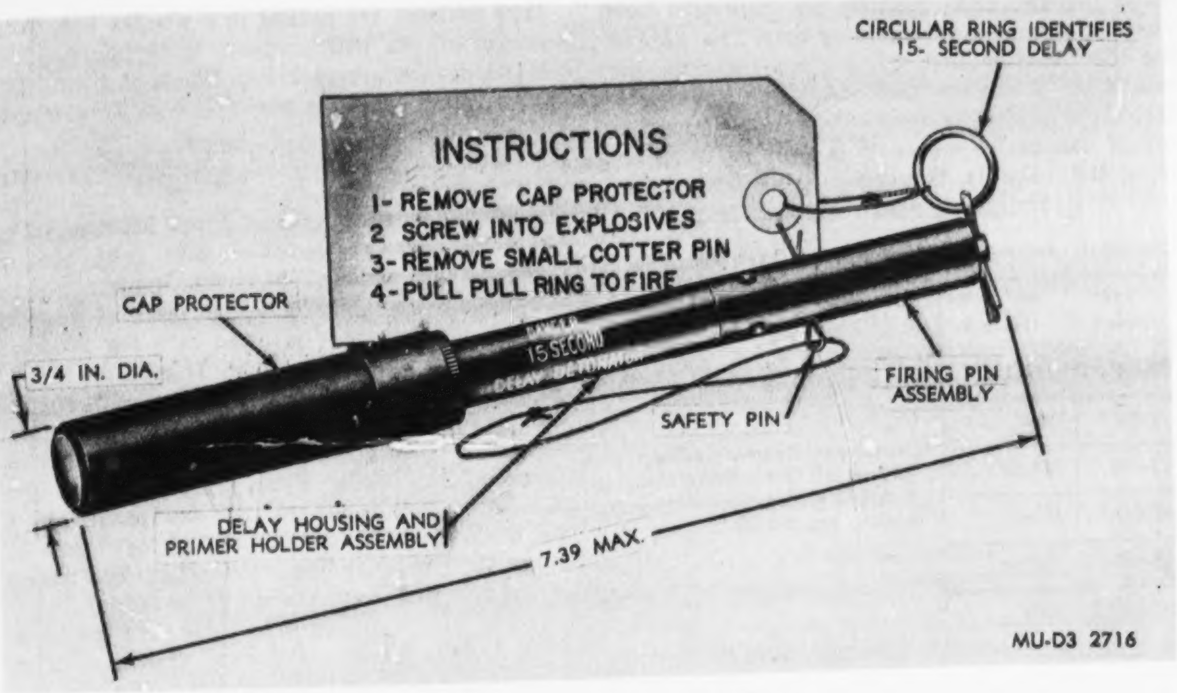


Figure 1-19. Percussion detonator M1A2.

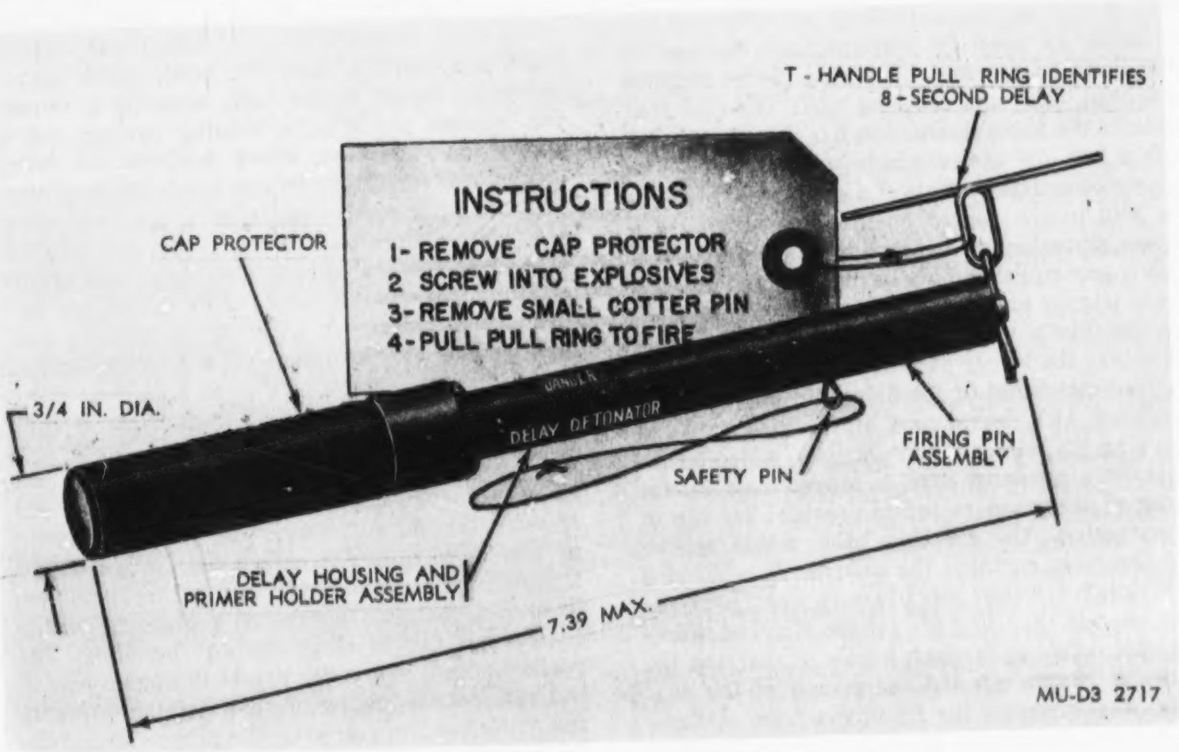


Figure 1-20. Percussion detonator M2A1.

tends through slots opposite an inspection hole near the primer of the coupling base. The color of the identification and safety strip indicates the length of the delay that the device functions (table 1-4). A restraining wire extends from the end of the device where it is held by a screw, along the ampoule, through a firing pin spring, and to the firing pin to which it is attached.

Table 1-4. Delay-type Demolition Firing Device M1—Data

Delay (in minutes)	Identification and safety strip color	Packing
6-14	Black	10 per carton; 1 carton per bag; 15 bags per fiberboard carton; 3 cartons (450 devices) per wooden box; wt, 56 lb.
12-32	Red	
45-115	White	
100-280	Green	
210-570	Yellow	
610-1,130	Blue	

(2) *Firing device, demolition: M1 and M1A1, pressure-type* (figs. 1-22 and 1-23). Pressure-type demolition firing devices are similar in functioning and appearance. They are designed for actuation by pressure and intended for use in mines and boobytraps. The firing device consists of a head, case, and coupling base. The case that contains the firing mechanism has three lugs, each with a hole for use in anchoring the device. The firing mechanism consists of a spring-loaded firing pin held in the *cocked* position by a firing pin release pin, which is attached to the pressure cap. This is accomplished by a keyhole-shaped opening in the trigger pin. The smaller part of this opening fits into a groove in the firing pin (cocked position); the larger part of the opening permits the free movement of the firing pin upon release. The head, an integral part of the case, contains the firing pin release pin mechanism, which terminates in a pressure cap. A tapped hole in the center of the pressure cap is provided for use of an extension. The coupling base, which screws into the case, contains the primer. A removable fork, located under the pressure cap, prevents movement of the firing pin release pin. The safety pin, which passes through a hole in the case between the firing pin and the primer of the coupling base, prevents the firing pin from striking the primer should the firing pin be accidentally released. Five pressure-type demolition firing devices M1 are packed in a cardboard box, 30 boxes (150 devices) are packed in a wooden box. Total weight of box with contents is 78 pounds. Five M1A1 devices are packed in a box, 50 boxes (250 devices) are packed in a wooden box. Total weight of box with contents is 80 pounds.

(3) *Firing device, demolition: M5, pressure-release-type* (figs. 1-24 and 1-25). Pressure-release-type demolition firing device M5 consists of a rectangular pressed-steel case containing a spring-loaded striker. The striker is restrained by a release plate, which is held in place by a safety pin. A coupling base is fitted into the threaded hole in the bottom of the case. This device is used to activate antitank mines equipped with supplementary fuze wells (cap wells) and for general boobytrap installations with charges having threaded cap wells. Four pressure-release-type demolition firing devices M5 are packed in a paperboard box, 5 boxes in a fiberboard box, 10 boxes (200 devices) in a wooden box. The weight of the box with contents is 51.9 pounds.

(4) *Firing device, demolition: M1, pull-type* (figs. 1-26 and 1-27). Pull-type demolition firing device M1 is designed for actuation only by a pull on a trip wire and is intended for use with improvised antipersonnel mines, for boobytrapping antitank mines, and for setting up boobytraps. This firing device consists of a cylindrical case (body), head, and coupling base. The head, which is permanently joined to the case, contains a release pin, release pin ring, a loading spring, and a safety pin. The case, which contains the firing mechanism consisting of the firing pin and compression spring, also contains a positive safety pin. The coupling base, which is screwed into the case, contains the primer. The outer end of the coupling base is threaded to fit activators and demolition charge cap wells. A blasting cap may be assembled to the nipple. The pull-ring end of the firing pin, which is slotted axially to form four jaws, passes through a cylindrical opening in the case. The end of the release pin, fitting into an axial hole in the slotted end of the firing pin, causes it to engage on the upper surface of the opening, thereby restraining downward movement of the firing pin. The safety pin, which passes through a hole in the head and a hole in the release pin, prevents accidental movement of the release pin during shipment and handling. The positive safety pin, which passes through a hole in the case between firing pin and primer, prevents the firing pin from striking the primer should the firing pin be accidentally released. An anchor cord on the case is used to anchor the firing device firmly during installation. Five pull-type demoli-

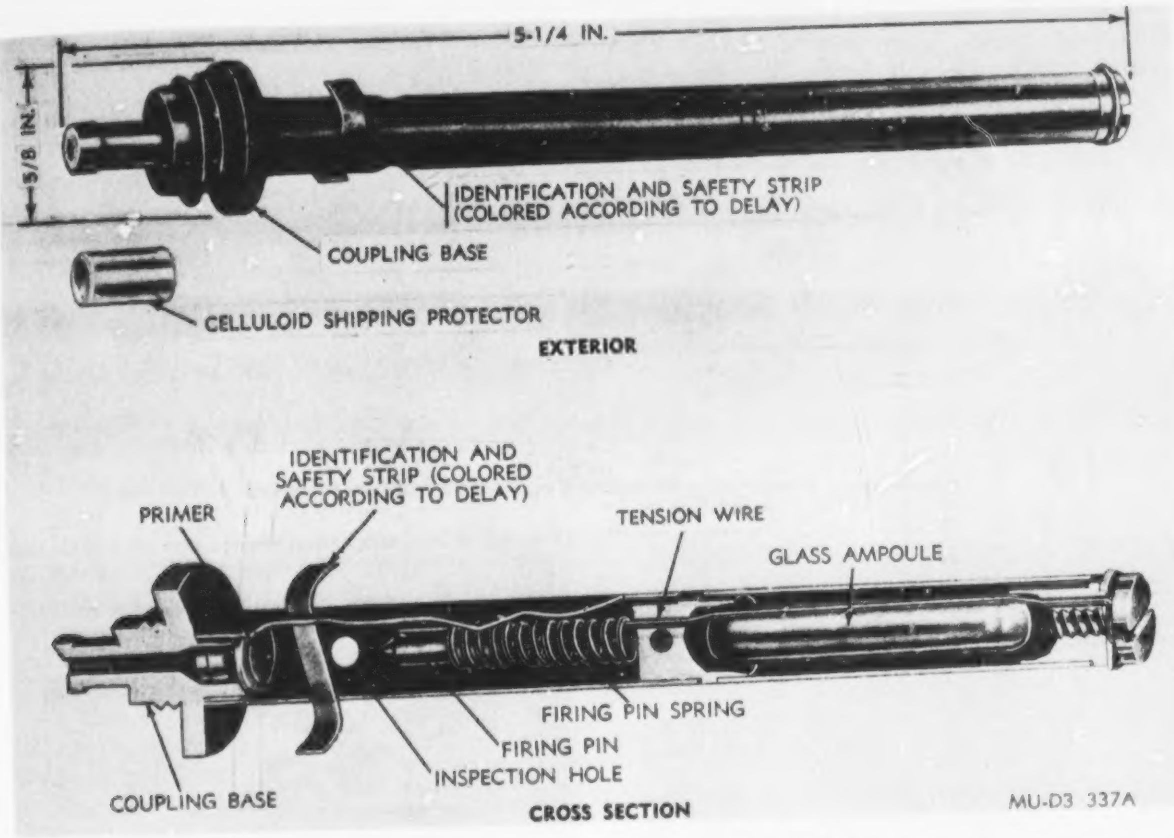

5-1/4 IN.
5/8 IN.
IDENTIFICATION AND SAFETY STRIP (COLORED ACCORDING TO DELAY)
COUPLING BASE
CELLULOID SHIPPING PROTECTOR
EXTERIOR
IDENTIFICATION AND SAFETY STRIP (COLORED ACCORDING TO DELAY)
PRIMER
TENSION WIRE
GLASS AMPOULE
FIRING PIN SPRING
FIRING PIN
INSPECTION HOLE
COUPLING BASE
CROSS SECTION
MU-D3 337A

Figure 1-21. Delay-type demolition firing device M1.

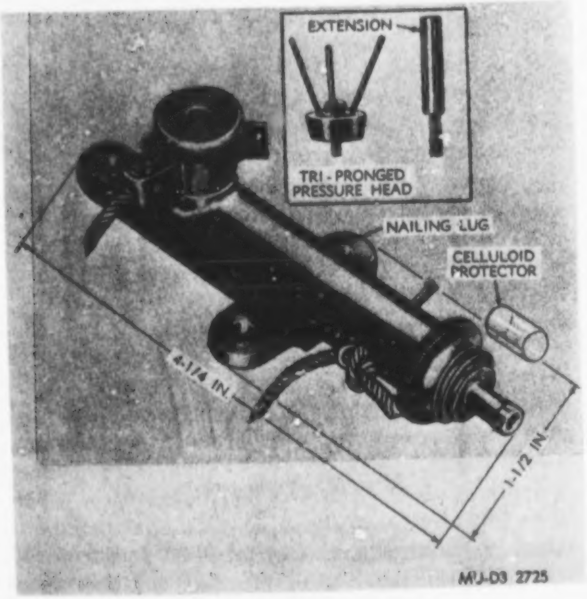


Figure 1-22. Pressure-type demolition firing device M1A1.

tion firing devices M1 with 2 spools of trip wire are packed in a chipboard box, 30 boxes (150 devices with 60 spools) are packed in a wooden box, weight 35 pounds or five devices with 2 spools of trip wire are packed in a chipboard box, 1 box per lead-foil envelope, 40 envelopes (200 devices with 80 spools) are packed in a wooden box, weight, 59 pounds.

(5) *Firing device, demolition: M3, pull-release-type* (figs. 1-28 and 1-29). This firing device is a mechanical device containing a percussion cap. It is designed for actuation by either an increase (pull) or decrease (release) of the tension in a taut tripwire and is intended for use with antipersonnel mine M3, improvised antipersonnel mines, or in setting up boobytraps.

(*a*) The firing device consists of a head, body, coupling base, firing pin, release pin, safety pin, and winch assembly. The head, which is crimped to the body, acts as a guide for the release pin. The body contains a spring-loaded firing pin, in which the knob end of the release pin is installed. The coupling base, which screws into

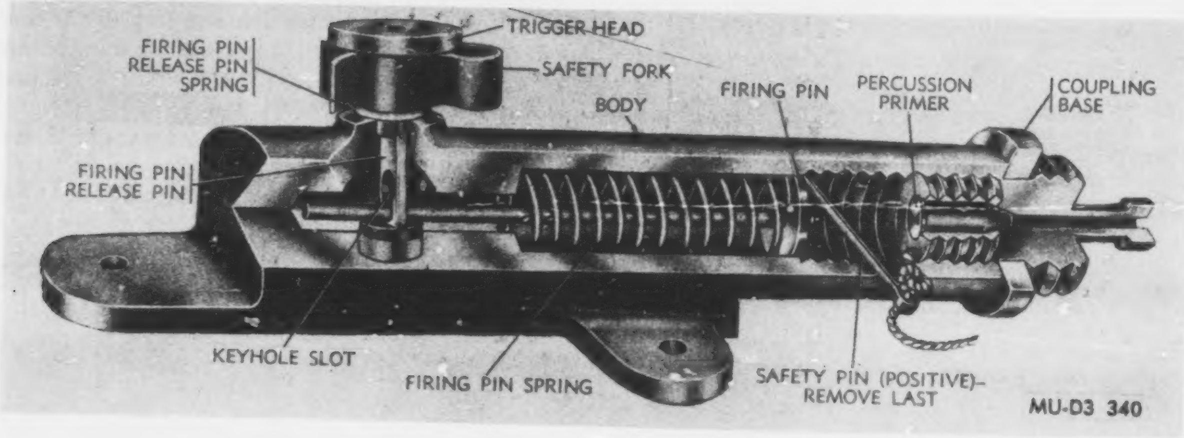


Figure 1-23. Pressure-type demolition firing device M1A1—cross section.

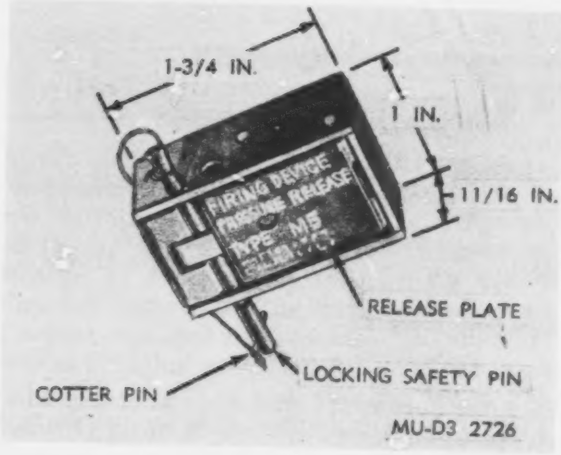


Figure 1-24. Pressure-release-type demolition firing device M5.

the body, contains the primer. The outer end of the coupling base is threaded to fit activators and firing device wells (cap wells) and has a nipple. A blasting cap may be assembled to the nipple.

(*b*) The outer end of the firing pin is slotted longitudinally to form four jaws, and grooved internally to receive a knob on the inner end of the release pin. The slotted end of the firing pin passes through a cylindrical opening in the body. It is held in this position by the knob of the release pin when the release pin is in its normal axial position and the safety pin in place. The safety pin passes through an elongated opening in the head and a hole in the release pin. A small cotter pin, which passes through a hole in the end of the safety pin, prevents accidental movement of the safety pin during shipment. The safety pin when in position, prevents forward or backward movement of the release pin (beyond the slight movement permitted by the elongated slot in the head), thus preventing release of the firing pin. The winch consists of a bracket, spool with a

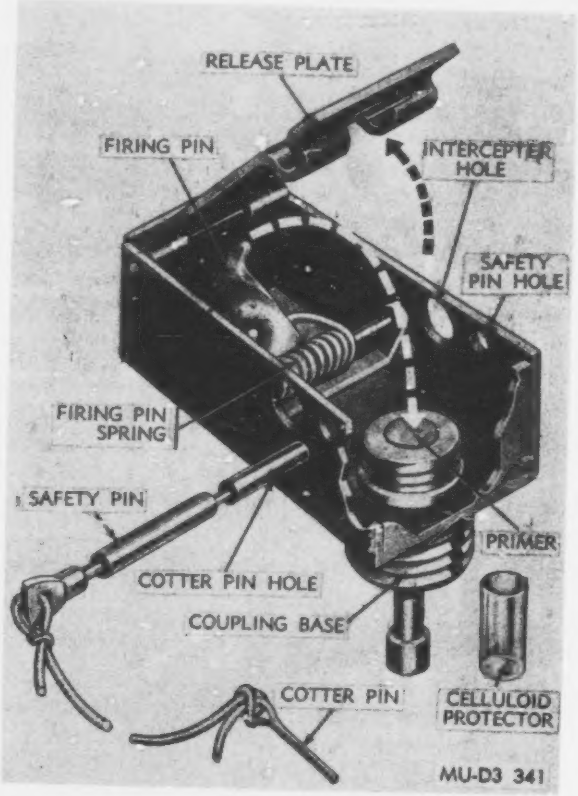


Figure 1-25. Pressure-release-type demolition firing device M5—cross section.

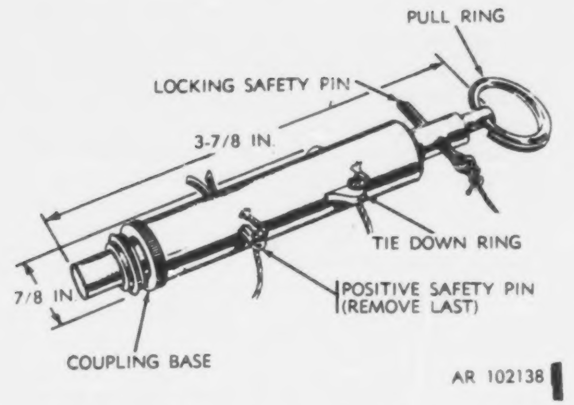


Figure 1-26. Pull-type demolition firing device M1.

knurled knob, and a pawl, and is attached to the outer end of the release pin.

(c) A positive safety pin, one leg of which passes through a hole in the body between the firing pin and the primer, prevents the firing pin from striking the primer should the firing pin be accidentally released. The other leg of the safety pin is bent around the body, to keep it in place during shipment and handling. An anchore cord (12-inches long), attached to the eyelet on the body, is used to anchor the firing device firmly during installation. Five pull release type demolition firing devices M3 with two 80-foot spools of trip wire are packed per package, 5 packages per inner package, 6 inner packages (150 devices and 60 spools) per wooden box, weight 49.9 pounds.

(6) *Firing device, demolition: M1, release-type* (figs. 1-30 and 1-31). Release-type demolition firing device M1 is designed to be actuated when a restraining weight is removed from it and is intended for use in setting up boobytraps. The restraining weight is applied at the time of installation. The firing device is restrained from firing as long as there is a load greater than 3 pounds on the top face of the latch. The firing mechanism of this device is approximately 2-inches square by 3-inches long. It is fitted with a cover at one end and a threaded hole to receive a primed coupling base at the opposite end. The body houses a spring lever, a spring, and a firing pin. One end of a steel latch engages a lip on the lever, the remaining portion of the latch rests on top of the device and, as issued, is held in place by a safety pin. This arrangement holds the lever in the set position. Two $\frac{5}{16}$-inch holes are provided in the sides of the body, to permit the insertion of a nail or heavy gage wire to act as an additional safety device by intercepting the lever and preventing it from striking the firing pin should premature functioning occur during installation. A strip of metal $\frac{3}{4}$-inch wide and 4-inches long spotwelded to the base of the body serves as a nailing bracket. Four release type firing devices are packed per chipboard box, twenty boxes (80 devices) per wooden box. weight, 44.1 pounds.

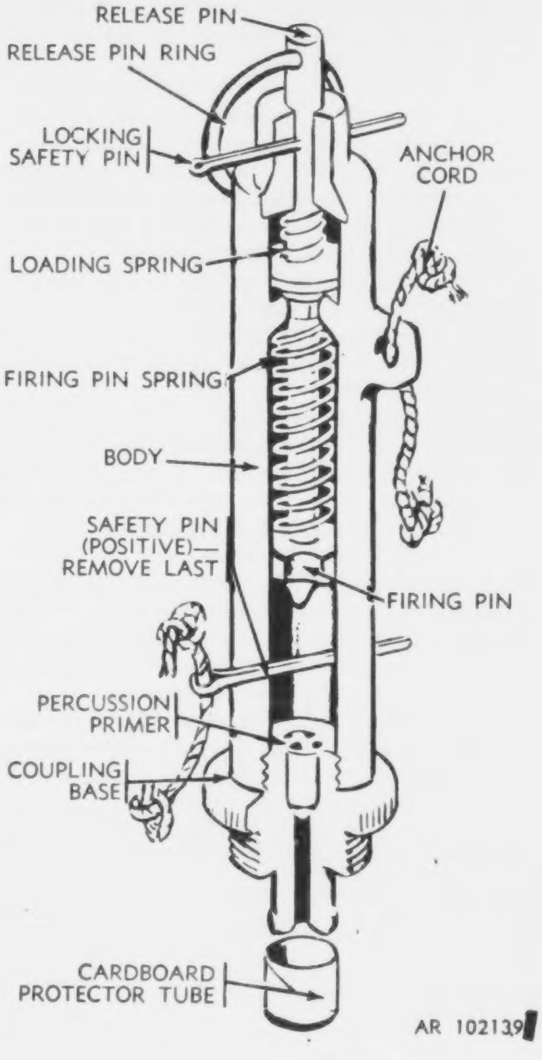


Figure 1-27. Pull-type demolition firing device M1—cross section.

(7) *Firing device demolition: Multipurpose M142* (fig. 1-31a).

(*a*) The M142 is a mechanical firing device intended for use with anti-personnel mines and demolition charges when setting up boobytraps. The basic component of the device is a mechanical switch designed for actuation (to initiate the explosive) by pressure, pull, pressure release or tension release. In addition to its four mode capability, the M142 can be used to ignite either a blasting cap (as other firing devices) or a time blasting fuse for seting a short delay type boobytrap. The device is weather sealed and will function under water.

(*b*) The firing device consists of a number of different components to facilitate operation in its various modes (fig. 1-31b).

1. The switch (fig. 1-31c) contains a spring loaded firing pin held in position by a movable sear plate that can be set to release the firing pin in any one of the four operating modes.

(a) The operating mode is determined by selective removal of one of the two pivot pins in the switch which permits the sear plate to rotate about the other pivot pin. When both pins are in place the sear plate is locked in position. The two pivot pins (round head pivot pin and square head pivot pin) are of different diameters and are not interchangeable.

(b) When the switch is set for pull or pressure (by removal of the square head pin) a pull of 7 lbs min or a pressure of 25 lbs minimum makes the sear plate pivot on the round-head pin, releasing the spring loaded firing pin.

(c) When the switch is set for pressure release (by removal of the round-head pin), the sear plate is held down by a load of at least 2 lbs. Removal of the 2 lb load makes the sear plate pivot on the square-head pin, releasing the spring loaded firing pin.

(d) When the switch is set for tension release (by removal of the round-head pin). The sear plate is held under tension by a taut tripwire. Cutting of the tripwire makes the sear plate pivot on the square-head pin, releasing the spring loaded firing pin.

(e) A safety pin is incorporated in the switch to prevent accidental initiation. It is positioned in front of the firing pin and is only removed after the desired operating mode is set up.

2. The tripwire consists of 50 feet of copper wire wound on a cardboard or plastic spool. The olive drab coat of paint over the wire prevents it from accidentally unwinding and aids concealment. A retaining clip on the cable reel assembly (spool of tripwire) is on later production items. This clip is given for convenience to prevent remaining cable from unwinding. Tripwire is used in the tension release mode and in the pull mode.

3. The tension release attachment is a special formed stainless steel wire that has a spring type action. In the tension release mode the attachment holds the tripwire under tension that, in turn, maintains the firing device in a constant armed position. Actuation is initiated when the taut tripwire is cut which permits the sear plate to release the firing pin.

4. The coupling body is a cylindrical plastic assembly that contains the explosive initiating element, an M42 primer, but no blasting cap. The coupling body is interchangeable with the standard coupling base in functioning attached blasting caps (fig. 1-31d) and, in addition, has the alternate capability of lighting a time blasting fuse. The coupling body has another advantage over the standard coupling base in that is not necessary to crimp the blasting cap to attach it.

5. An *instruction sheet* giving abbreviated set-up instructions is provided with each device.

6. *Fasteners*, a set of nails and screws, for securing the switch are included with each device. When required the switch can be secured to a tree limb or similar object with a tie-down wire, a special hole is provided in the switch for this purpose.

(*c*) The olive drab plastic switch and coupling body are unpainted. They are unmarked except for a yellow band painted on the coupling body. The brass safety pin and steel pivot pins are unpainted.

(*d*) The M142 firing device components in addition to the instruction sheet, screws and nails are packed in a cylindrical metal container 3⅛ in. diameter and 1¼ in. high. Fifty-six containers are packed in four M19A1 ammunition boxes (14 per box).

g. *Fuse, Blasting, Time.* Time blasting fuse transmits a flame from a match or igniter to a nonelectric blasting cap, providing a time delay wherein operators may retire to a safe distance prior to the explosion. There are two types: safety fuse and time blasting fuse M700. These may be used interchangeably.

(1) *Fuse, blasting, time: safety* (fig. 1-32). Safety time blasting fuse is used in general demolitions. It is in the form of a cord and has a black powder core covered with several layers of fiber and waterproofing material, usually orange in color. The burning rate may vary for the same or different rolls from 30 to 45 seconds per foot under different atmospheric and climatic conditions. Each roll must be tested prior to using in the area where the charge is to be placed. Particular precautions must be taken if used under water, as the rate of burning is increased significantly. Accordingly, each roll should be tested under water prior to preparation of the charge. In arctic temperatures, the outside covering becomes brittle and cracks easily. Safety time blasting fuse is packed as follows:

(*a*) 50-foot coil, 2 coils per package, and 30 packages (3,000 feet) in a wooden box; weight, 71.8 pounds.

(*b*) 50-foot coil, 2 coils per package, 5 packages sealed in a metal can, and 8 cans (4,000 feet) per wooden box. The weight, 93.6 pounds.

(*c*) 50-feet coil, 2 coils per package, and 60 packages (6,000 feet) per wooden box; weight, 162 pounds.

(2) *Fuse, blasting, time: M700* (fig. 1-33). Time blasting fuse M700 is similar to safety fuse and may be used interchangeably with it. The fuse is a dark green cord 0.2 inches in diameter with a plastic cover. Depending on the time of manufacture, the cover is smooth or has single bands around the outside at 1-foot or 18-inch intervals and double bands at 5-foot or 90-inch intervals. These bands are provided for easy measuring purposes. The burning rate is approximately 40 seconds per foot. The burning rate however must always be tested in the same manner as the safety fuse. Time blasting fuse M700 is packed in 50-foot coils, 2 coils per package, 5 packages per sealed con-

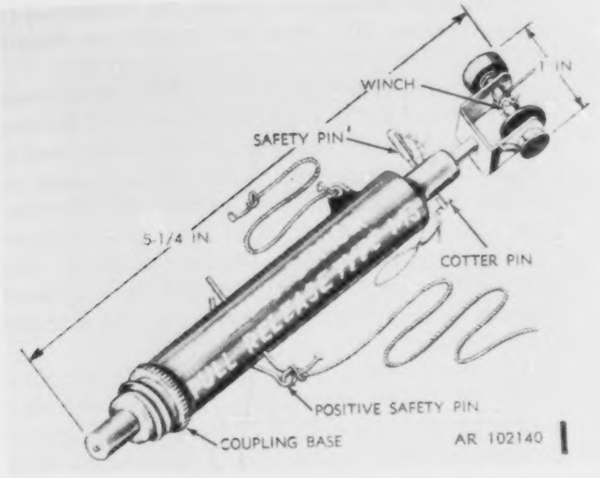


Figure 1-28. Pull-release-type demolition firing device M3.

tainer, and 8 containers (4,000 feet) per wooden box; weight, 94 pounds.

h. Igniter, Time Blasting Fuse. Time blasting fuse igniters are initiating components which are used in place of matches to light time blasting fuse. Fuse igniters are usually more reliable than matches and their use is almost mandatory in rainy and windy weather.

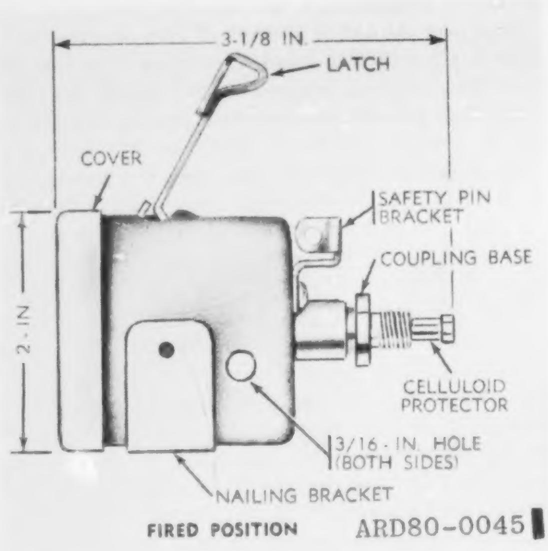


Figure 1-30. Release-type demolition firing device M1.

(1) *Igniter, time blasting fuse: M1, friction type* (fig. 1-34). Friction-type time blasting fuse igniter M1 consists of a paper tube containing friction powder,

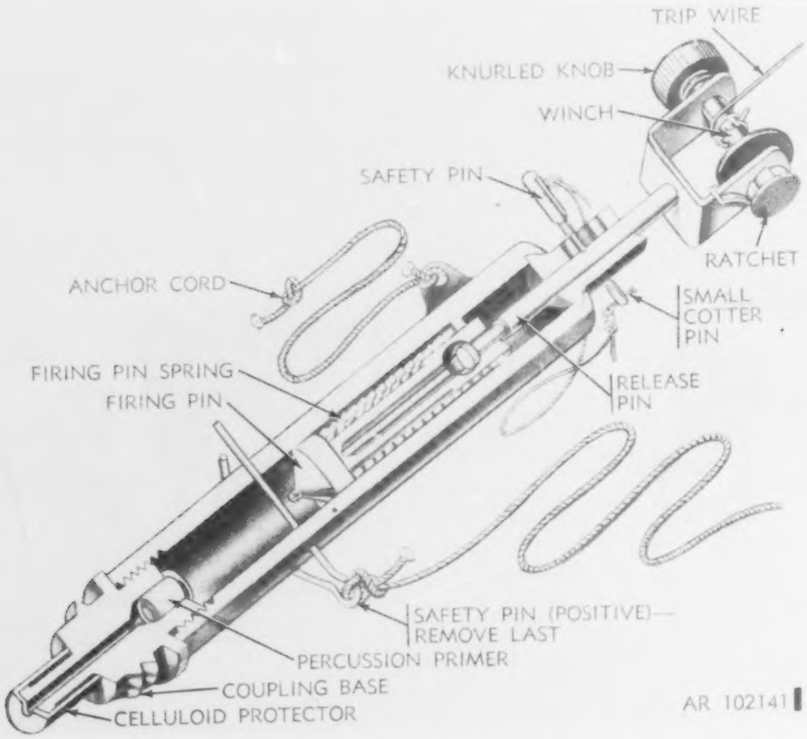


Figure 1-29. Pull-release-type demolition firing device M3—cross section.

which is mechanically ignited. The open end, when placed over the end of a length of time blasting fuse, is held in place by a pronged insert inside the fuse igniter. The prongs are inclined so they permit the fuse to enter, but prevent its removal except by force. A pull on the loop, or handle at the closed end, ignites the friction powder which, in turn, fires the powder train in the fuse. Ten friction-type time blasting fuse igniters M1 are packed in a waxed cardboard container, 250 containers (2,500 igniters) are packed in a wooden box.

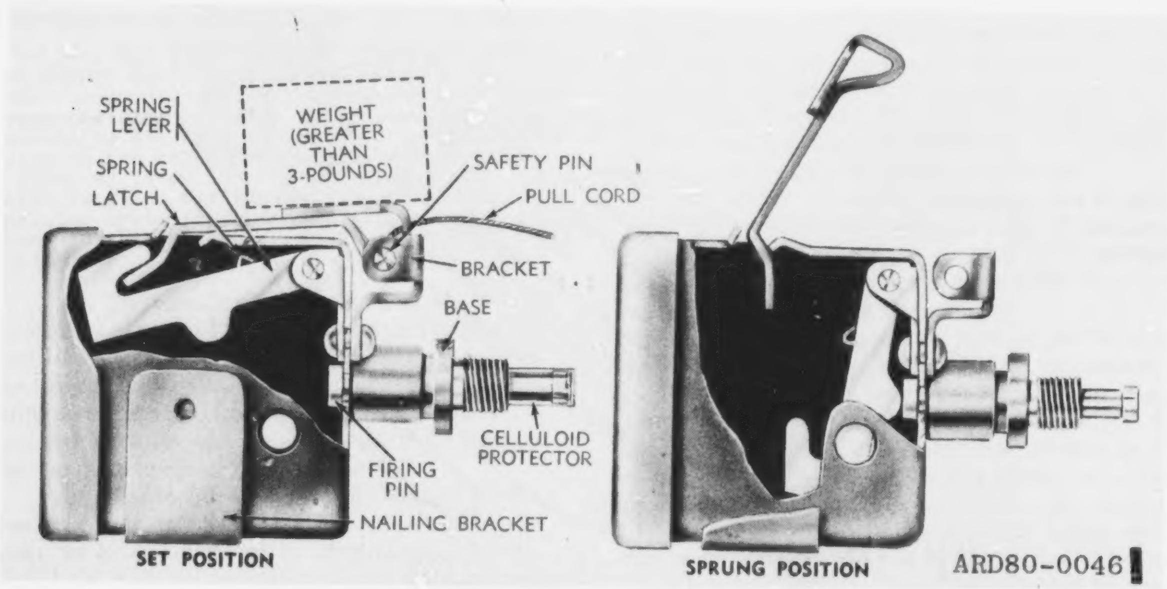
(2) *Igniter, time blasting fuse: M2, weatherproof* (fig. 1-35). Weatherproof time blasting fuse igniter M2 consists of a barrel that holds the firing mechanism and a base that contains a percussion cap and a pronged fuse retainer. The barrel contains the striker spring and striker, held locked in one end by a release pin. The other end is threaded to fit over the base. Plastic sealing material (included with the igniter) is used to waterproof the joint of time blasting fuse and fuse igniter. When the release pin is pulled, the striker strikes the percussion cap which, in turn, ignites the fuse. The igniter will ignite the fuse under all weather conditions, even under water if properly waterproofed. Weatherproofed time blasting fuses M2 are packed as follows:

(*a*) 5 per waterproof carton, 30 cartons (150 igniters) per box.

(*b*) 5 per set-up box, 5 boxes per waterproof fiberboard carton, 10 cartons (250 igniters) per wooden box.

(3) *Igniter, time blasting fuse: M60, weatherproof* (figs. 1-36 and 1-37). The weatherproof time blasting fuse igniter M60 is a pull-type assembly and is used to initiate time blasting fuse. It may be used under all weather conditions and even underwater. A watertight seal is formed only with the smooth-surfaced time blasting fuse M700. Five weatherproof time blasting fuse igniters are packed in a waterproof wrapped carton, 60 cartons (300 igniters) are packed in a wooden box.

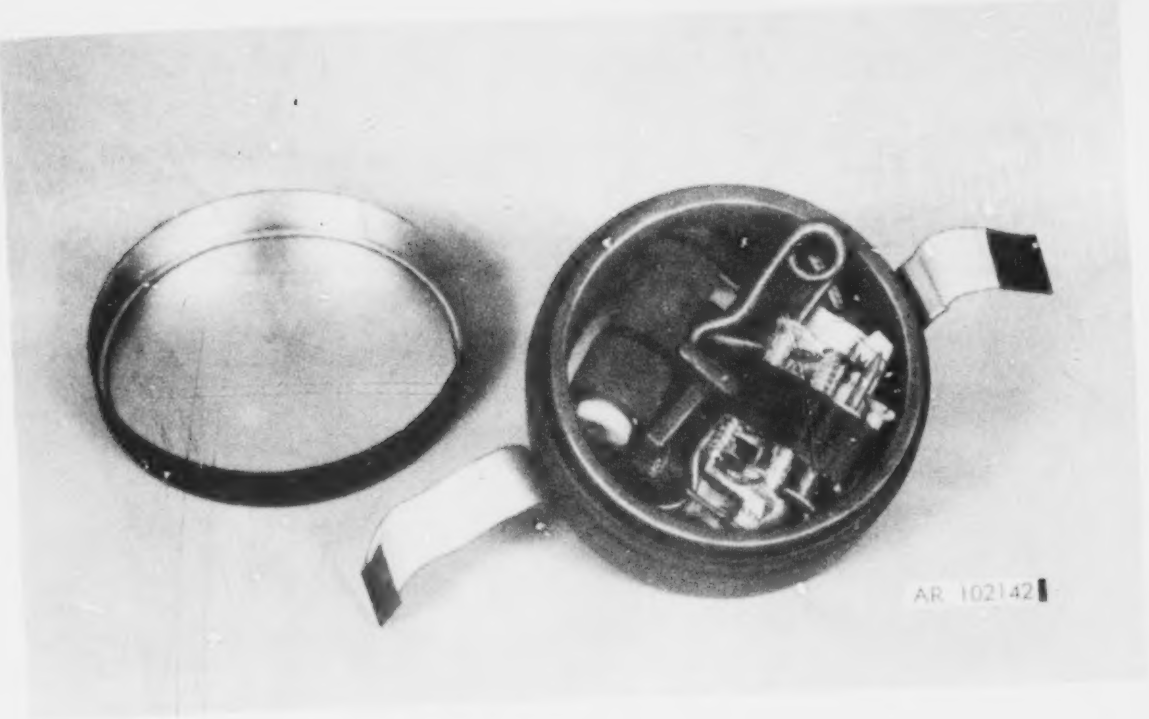
i. Primer, Percussion: Cap M2 and Improved No. 3 (fig. 1-29). Percussion primer M2 and Improved No. 3 are essentially the same. When struck by a firing pin, a percussion primer emits a small but intense flame through its open end which will initiate a blasting cap. Demolition firing devices and firing device coupling bases are issued with percussion primers already installed. Percussion primer M2 and Improved No. 3 are issued separately for repriming firing devices used in training. One hundred cap percussion primers M2 are packed in an inner cardboard box, 50 boxes per cardboard box, 1 cardboard box (5,000 primers) per wooden box.



SET POSITION

SPRUNG POSITION

Figure 1-31. Release-type demolition firing device M1—cross section.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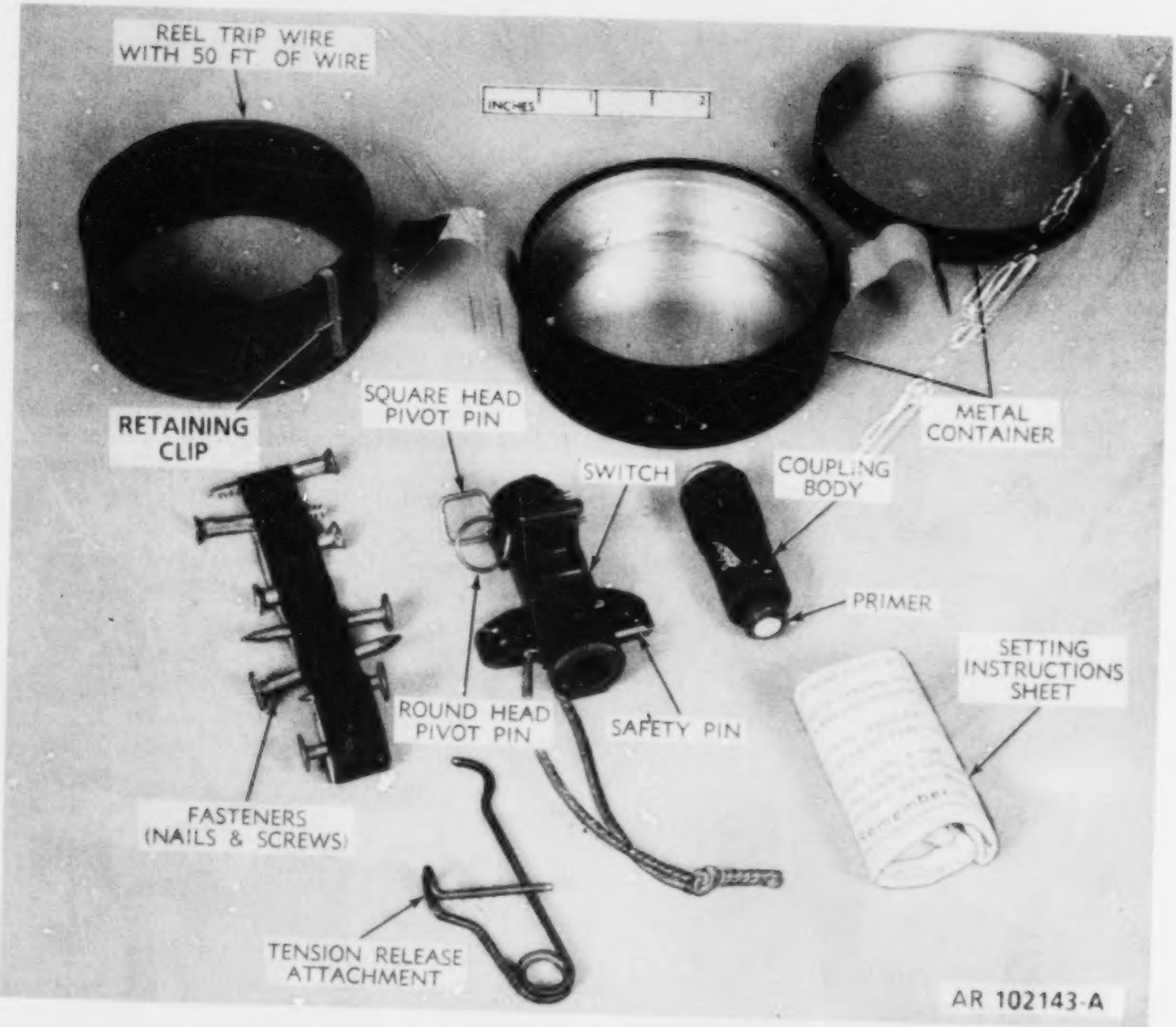

Figure 1-31b. Firing device components M142

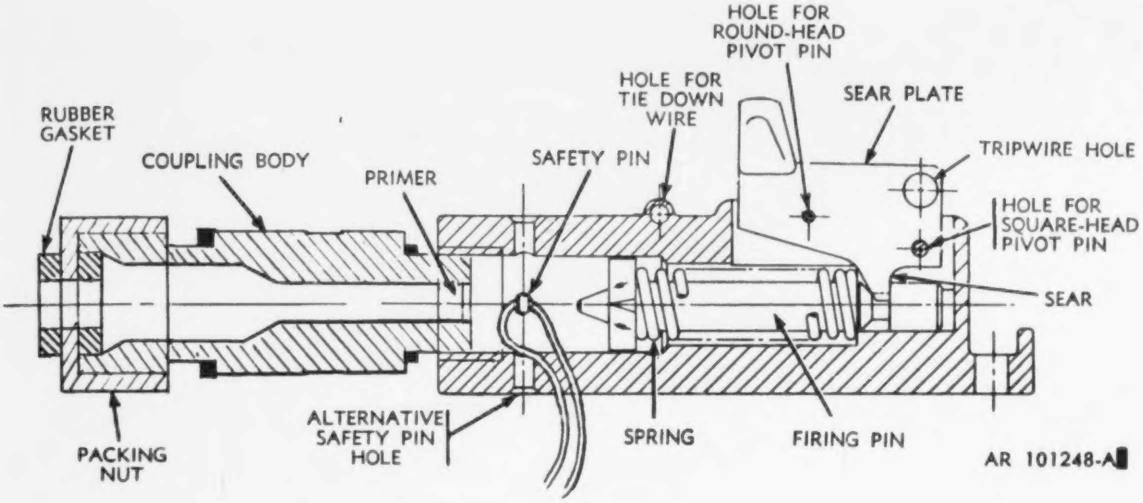

Figure 1-31c. Firing device assembly M142—cross-section.

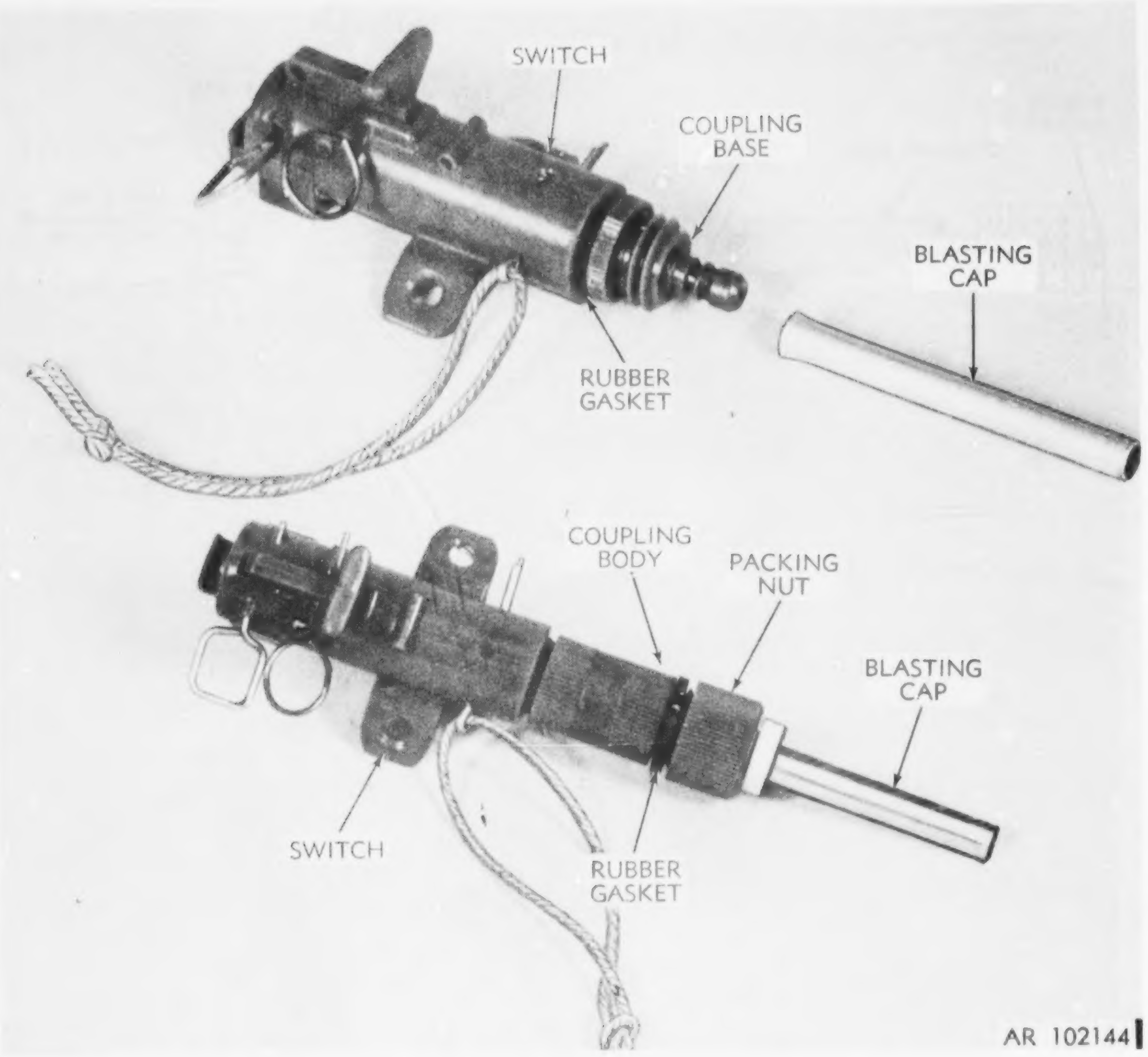

Figure 1-31d. Firing device assembled with alternate coupling arrangements.

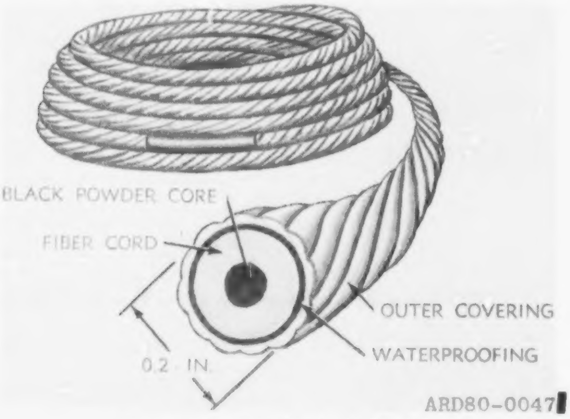

Figure 1-32. Time blasting (safety) fuse.

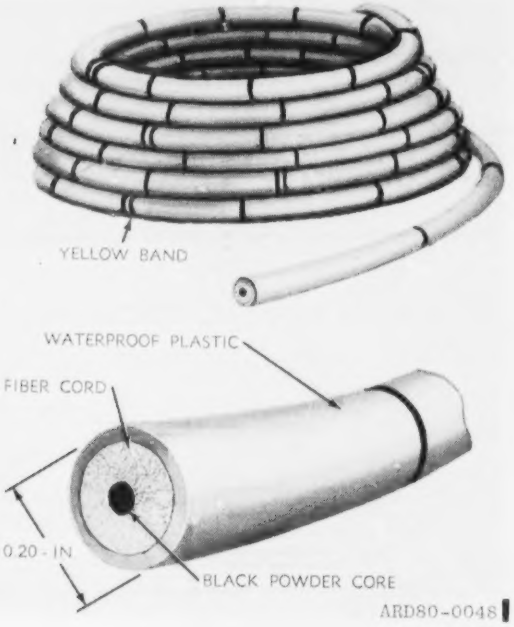

Figure 1-33. Time blasting fuse M700.

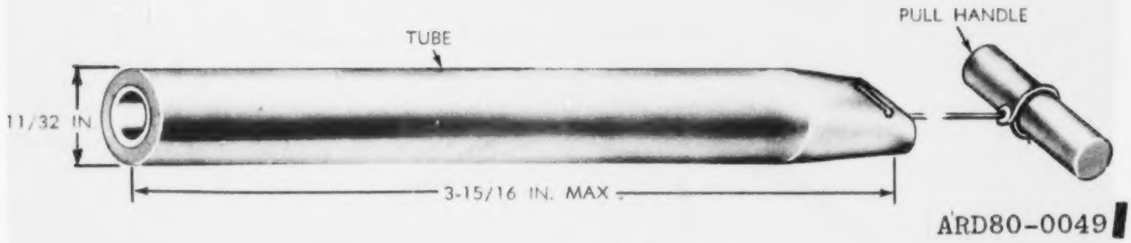

Figure 1-34. Time blasting fuse igniter M1.

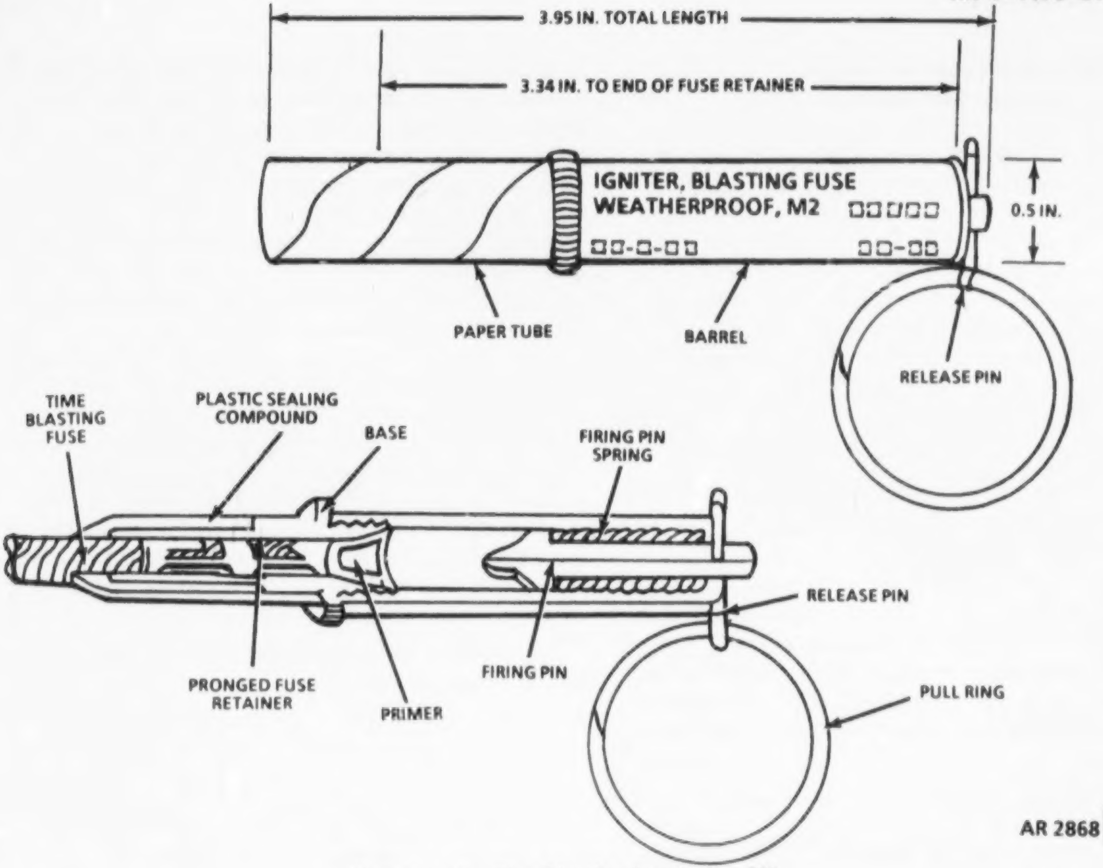

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Figure 1-35. Time blasting fuse igniter M2.

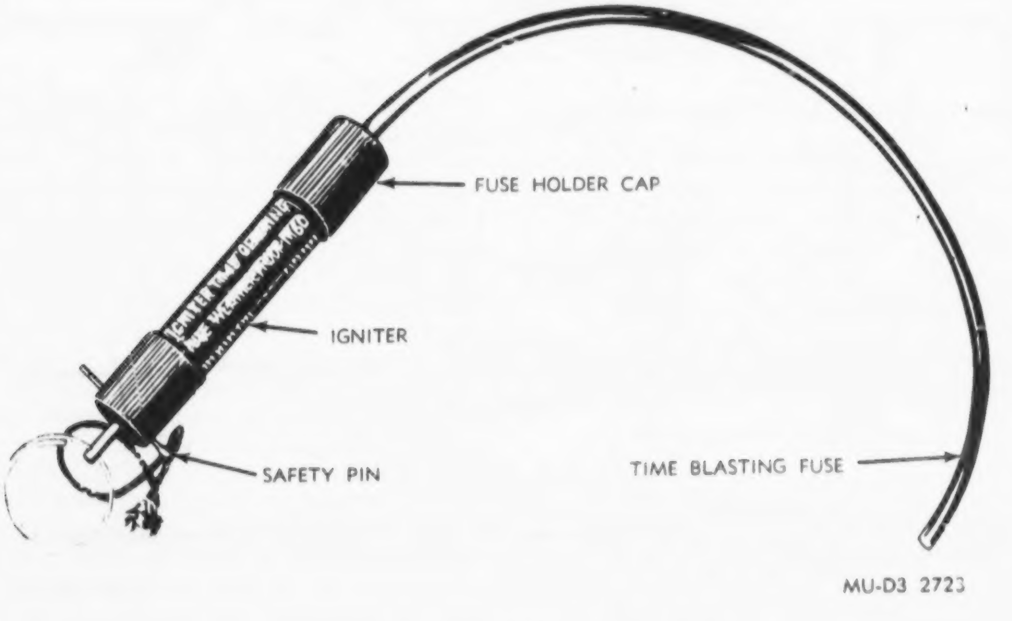

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Figure 1-36. Time blasting fuse igniter M60.

1-12. Miscellaneous Demolition Accessories (Nonexplosive)

a. Adapter, Priming: M1A4 (fig. 1-38). Priming adapter M1A4 is a plastic hexagonal shaped device threaded to fit in standard threaded cap wells and to fit the universal explosive destructor M10. A shoulder inside the threaded end is large enough to accept time blasting fuse and detonating cord but too small to permit passage of a militay blasting cap. The adapter is slotted longitudinally to permit easy and quick insertion of the electric blasting cap lead wires. The priming adapter M1A4 is easily handled by men wearing arctic mittens.

b. Adhesives and SealingCompound.

(1) *Adhesive, paste M1.* Paste adhesive M1 is a sticky, putty-like substance used to attach charges to vertical or overhad flat surfaces. It is useful in holding charges while tying them in place or, under some conditions, for holding with out tying. It will not adhere satisfactorily to dirty, dusty, wet, or oily surfaces, and becomes stiff and hard and loses its adhesiveness at subzero temperatures (F.°). It is softened by water and becomes useless if wet.

(2) *Adhesive, charge demolition* (fig. 1-39) Charge demolition adhesive, supplementary adhesive, is used to hold demolition charges when target surface is below freezing, wet, or underwater. The adhesive is used in a tube in water-resistant, cardboard, slide boxes packaged with wooden aplicators.

(3) *Compound, Sealing.* Sealing compound is used to waterproof the connection between the time blasting fuze and the nonelectric blasting cap. It does not make a permanent waterproof seal and must not be submerged in water unless the charge is to be fired immediately. An alternate material is being issued in lieu of the old sealing compound. It is "adhesive, sealant, NSN 8040-00-118-2695." Check the date on this material; it has a short shelf life.

c. Bag, Canvas Carrying. Canvas carrying bag is used for carrying selected demolition materiel

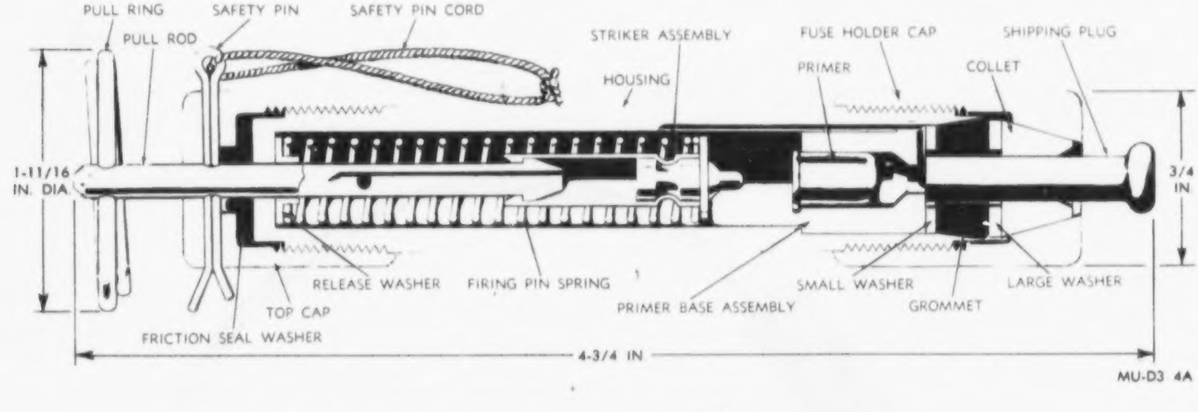


Figure 1-37. Time blasting fuse igniter M60-cross section.

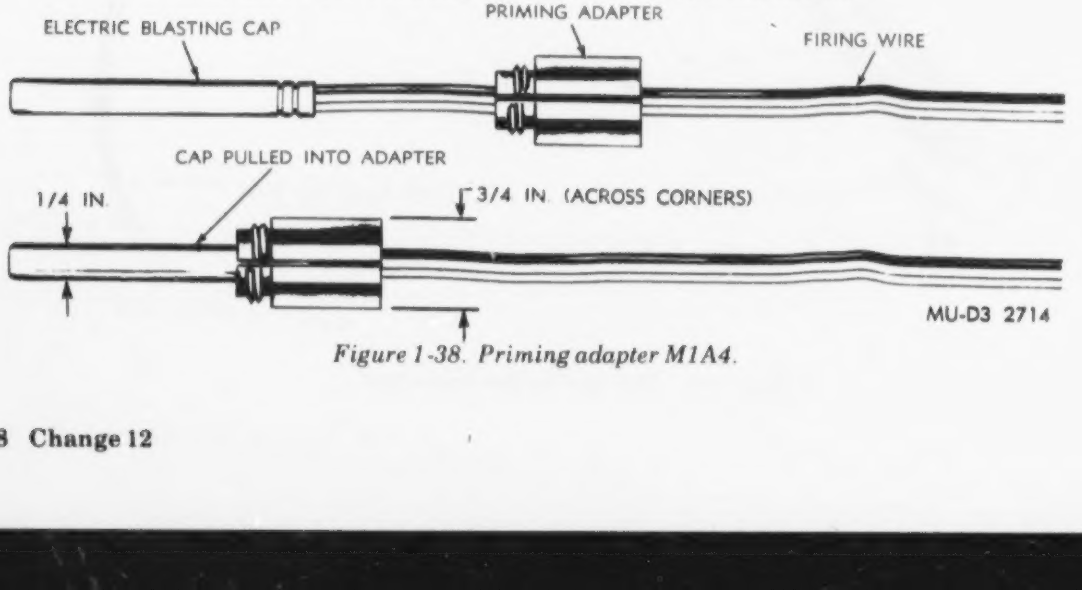


Figure 1-38. Priming adapter M1A4.

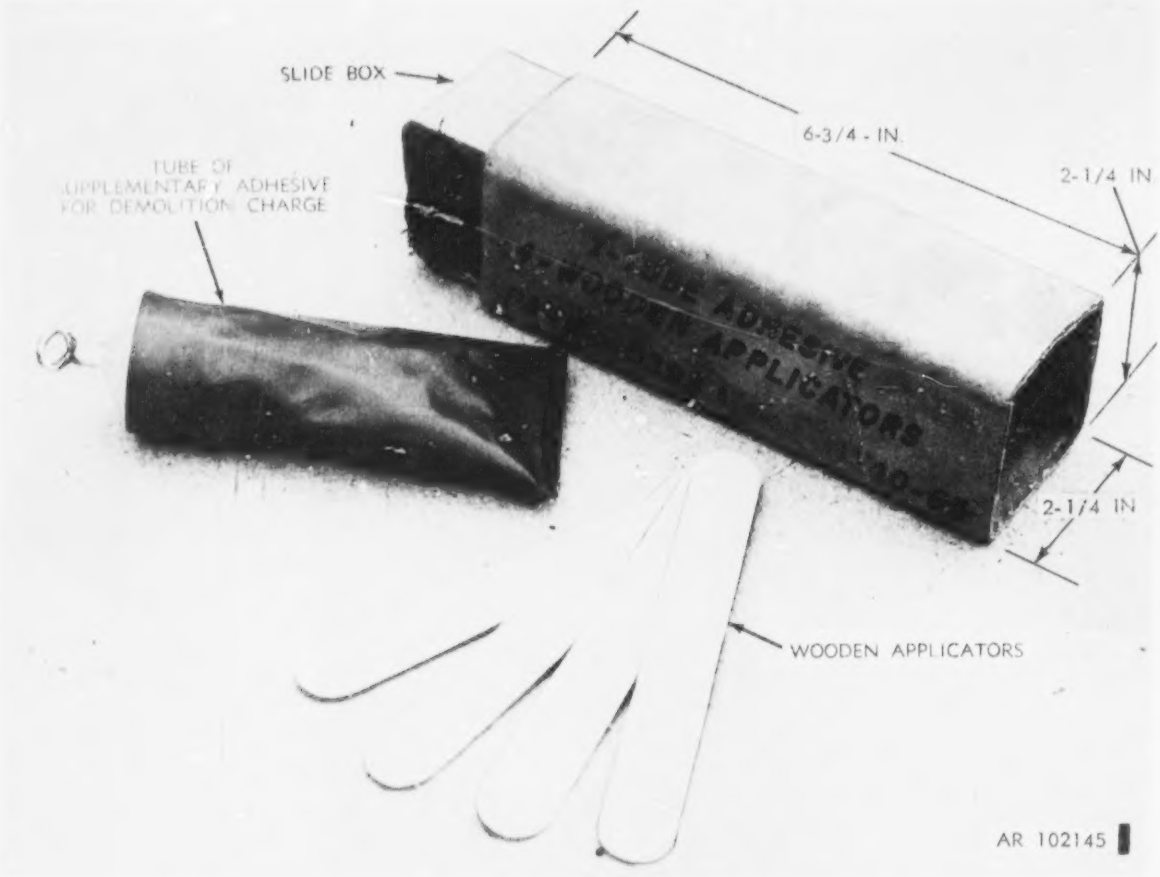


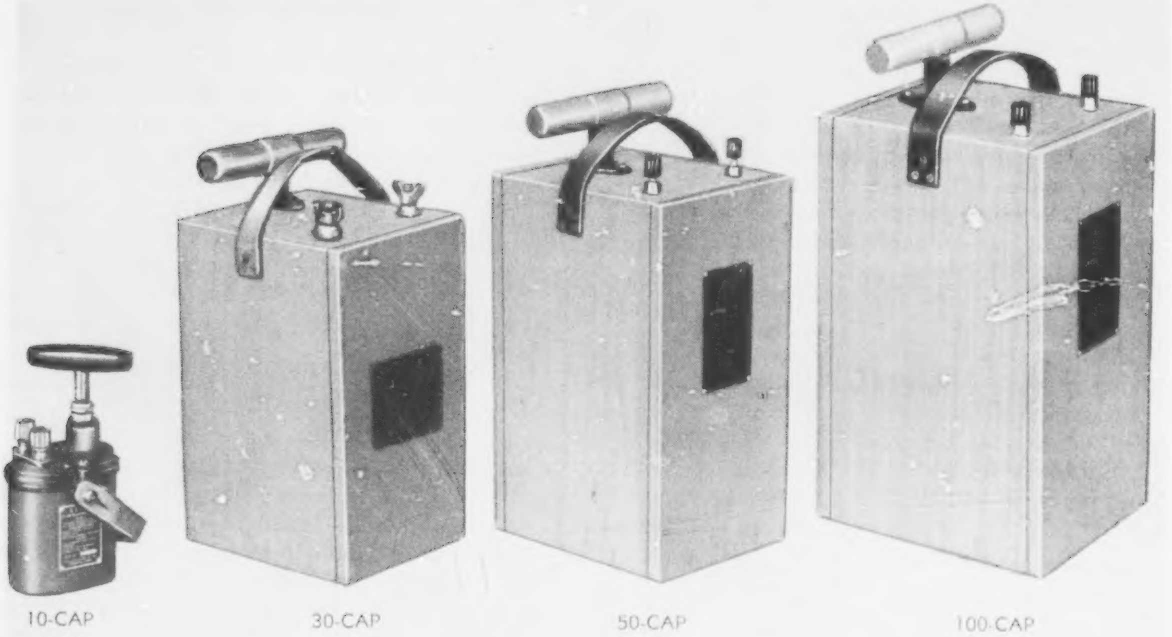
Figure 1-39. Supplementary adhesive for demolition charge.

for specific operations. It consists of a rectangular canvas receptacle with web shoulder and adjusting straps.

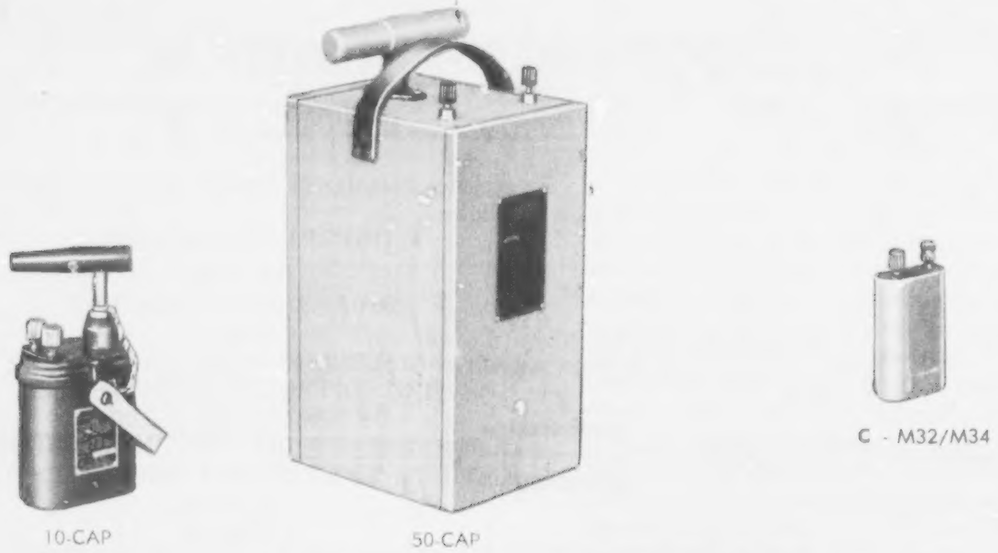
d. Blasting Machines. Blasting machines (fig. 1-40.1) are used to provide the electric energy needed in electric blasting operations. The family of blasting machines includes six models which derive their power directly from a shunt-wound dc generator; and two blasting machines (M32 and M34) which derive their power from an alternator and use a capacitor discharge output circuit. All machines except the M32 and M34 have a leather strap. Each generator-type machine has a brass nameplate containing pertinent data, whereas the M32 and M34 have identifying nomenclature molded on the body of the machine. The M32 is a light weight hand operated electric generator capable of initiating 10 M6 electric blasting caps. The M34 is similar to the M32 but is capable of initiating 50 M6 electric blasting caps. The term used in many NATO countries for blasting machine is exploder or dynamo exploder. Sample data appearing on nameplates are as follows:

(10-CAP DIXSON MACHINE)

U.S. ARMY
10-CAP BLASTING MACHINE
CAPACITY
10 ELECTRIC BLASTING CAPS WITH 30
FOOT COPPER LEG WIRES IN SERIES
FIRING INSTRUCTIONS
CONNECT EXTERNAL CIRCUIT TO BINDING
POSTS: TWIST HANDLE VIGOROUSLY TO
THE RIGHT.
CAUTION
THIS MACHINE MAY LOSE CAPACITY
TEMPORARILY. TO RESTORE: DISCONNECT
LEAD WIRES, TWIST HANDLE VIGOROUSLY
A FEW TIMES.
SERIAL NO.: 1485



A - OLDER GENERATOR-TYPE MACHINES



C - M32/M34

B - NEWER GENERATOR-TYPE MACHINES

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Figure 1-40. Blasting machines.

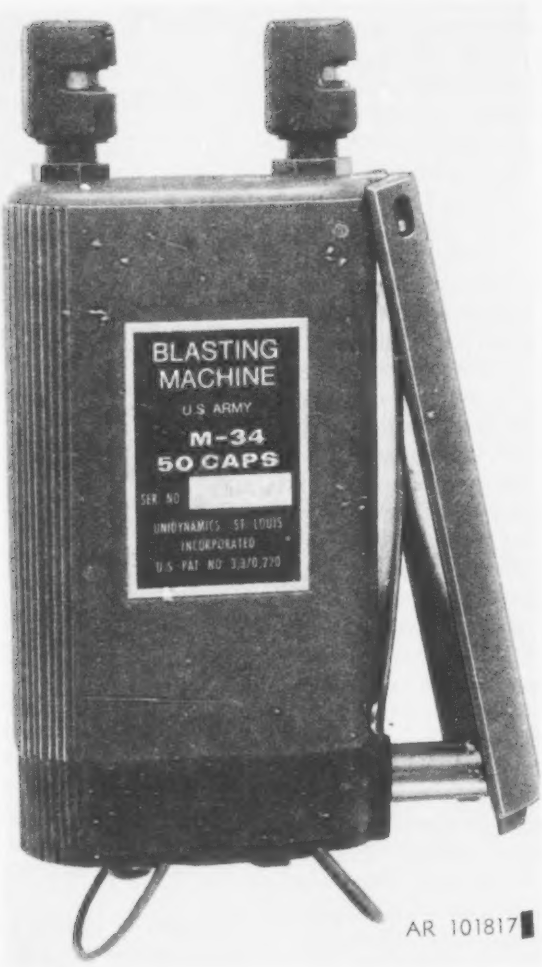


Figure 1-40.1. Blasting machine.

NSN 1375-00-782-5541
DA-11-173-AMC-499 (A)
DIXSON, INCORPORATED
GRAND JUNCTION, COLORADO, U.S.

(NEWER 50-CAP MACHINE)

STOCK NO. 1375-141-9495
CONT. NO. DA-11-199-ORD-1083
U.S.
BLASTING MACHINE
SERIAL NO. CAPACITY
A4375 50 CAPS
COPPER WIRES TO 30 FT.
OR IRON WIRES TO 6 FT EACH
CONNECT BLASTING CAPS ONLY IN SERIES
TO FIRE
RAISE HANDLE UNTIL IT STOPS:
PUSH DOWN QUICKLY WITH
FULL FORCE.
FIDELITY ELECTRIC CO. INC.
LANCASTER, PA.

(1) *Generator-type machines.* The generator-type machines, described individually below, are all actuated by means of a gear-driven armature. The 10-cap machines have metal cases and twist-type handles, with cases and handles painted gray, black or olive drab. The higher capacity machines have varnished or painted wood cases and plunger-type handles. Two distinct generations of generator-type machines are in existence as follows:

(*a*) *Newer machines (10-cap and 50-cap).*

NOTE

The machines most often used for electric blasting operations are the 10-cap and 50-cap machines.

In addition to having significantly higher electrical output than their predecessors, these machines include a built-in safety circuit. This circuit allows no current to reach the terminals until the machine's handle (or plunger) has been actuated with sufficient energy to gain nearly the maximum output from the machine. Therefore, unless such as level of output is reached, no current will flow to the terminals.

(*b*) *Older machines (10-cap, 30-cap, 50-cap, and 100-cap).* These include a switch which delays the flow of current from the generator to the terminals until the handle (or plunger) is near the end of its travel. This switch assures that output produced by machine's mechanism does not reach the terminals until the operator is producing maximum force. The older 10-cap machine is known as the Fidelity-type machine, since it was primarily manufactured by Fidelity Electric Company.

(2) *Blasting machines M32 and M34.* These small, lightweight blasting machines are intended to replace the larger, heavier machines. Instead of the shunt-wound dc generator, the machines use a small alternator which is gear-driven by the handle-actuated plunger. The electrical output from the alternator is reflected and fed into storage capacitors. When sufficient energy is available in the capacitors (this may take three or four strokes of the handle), an internal switching circuit discharges the electrical energy to the output terminals, and thus to the blasting circuit. If there is no blasting circuit attached to the terminals, this energy will be discharged through an internal bypass. The impact-resistant plastic housing completely seals the machine against sand, dust, and dirt, mud and even total immersion in three feet of water. The terminals, spring-loaded Signal Corps type, allow rapid and positive connection of the firing lead conductors. A D-ring clip on the base of the machine is used to hold the handle against machine body. The plunger is spring-loaded so that, when free form the D-ring clip, the handle is in the READY-TO-FIRE position (sway from machine body). Another D-ring clip is used for carrying the machine on a belt clip. A neon indicator lamp is located within the plastic housing between the terminals. When the machine is successfully actuated, a momentary glow is normally visible through the housing—whether or not a blasting circuit is attached to the output terminals.

e. Blasting Circuit Test Instruments (fig. 1-41). The only two instruments currently authorized for checking blasting circuits are the blasting galvanometer and test set M51. Both instruments are used to check circuit continuity; however, the blasting galvanometer, which uses the special battery, has the additional capability of indicating the approximate resistance of the circuit. Test set M51 does not require a battery and is usable over a wider range of temperatures.

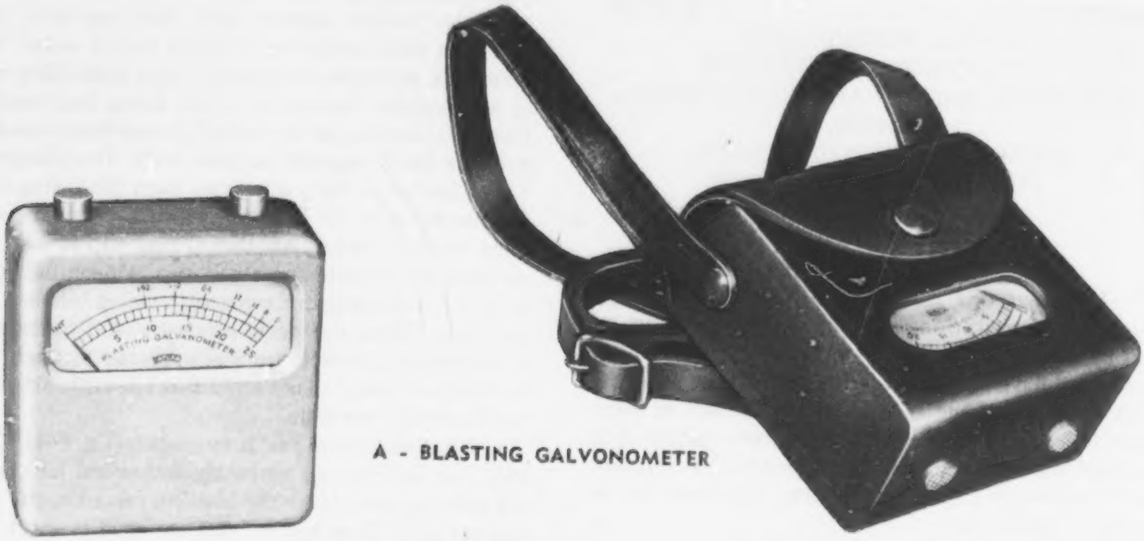
(1) *Galvanometer, blasting.* The blasting galvanometer (A, fig. 1-41) is a small instrument for checking the continuity and determining the approximate resistance of electrical blasting circuits. It works by sending a minute amount of current from a silver chloride battery through the blasting circuit and through a D-Arsonval meter. The meter's needle responds in proportion to the amount of resistance the current encounters in the blasting circuit. Type of battery authorized is dependent on operating temperatures, and is listed below:

Normal temperatures (0°F. to +125°F.)	Silver chloride dry cell, MIL type BA-245/u.
Low temperatures (−20°F. to 0°F.)	Silver chloride dry cell, MIL type BA-2245/u.

(2) *Test set, blasting cap: M51.* Test set M51 (B, fig. 1-41), which has a magneto-type generator, was developed as a replacement for the blasting galvanometer to test continuity of electrical blasting circuits.

When the handle of the test set is depressed, a minute amount of current flows from the generator, through the blasting circuit, and through a switching circuit. If the blasting circuit is continuous and has less than 200 ohms resistance, the current can flow through the blasting circuit and actuate the switching circuit, which lights the indicator lamp. The indicator lamp will also light if circuit is shorted since a short circuit is, in fact, a continuous circuit. If the blasting circuit is open or contains a high resistance, no current (or a very small amount) flows and the switching circuit is not actuated. The test set may be issued in lieu of the blasting galvanometer, both as a component of demolition kits or as a separate item of issue.

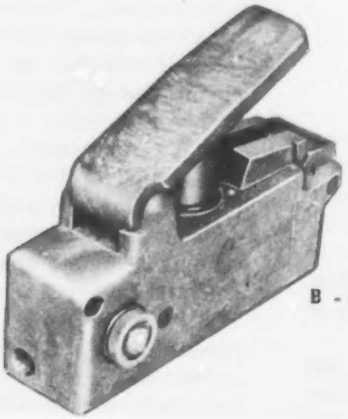
f. Box, Blasting Cap. Specially designed empty boxes of 10-cap capacity are provided for blasting demolition kits. These boxes consist of rectangu-



A - BLASTING GALVONOMETER

OUT OF CASE

IN CASE



B - BLASTING CAP TEST SET M51

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Figure 1-41. Blasting circuit test instruments

lar wooden blocks with telescoping covers. Holes in the block-like interior of the box are receptacles for nonelectric blasting caps. The boxes are filled with blasting caps when preparing sets for use. The blasting cap boxes are wood or plastic.

g. Chest, Demolition: Engineer 'Platoon, M1931. Demolition chest M1931 is used for storage and to facilitate use of demolition equipment sets. Partitions are arranged specially for keeping components of the kit in order.

h. Clip, Cord, Detonating: M1. Detonating cord clip M1, a steel device, is used to hold together two strands of detonating cord either parallel or at right angles of each other. Connections are made more quickly with these clips than with knots. Knots may loosen and fail to function properly if left in place. Joints made with clips are not affected by long exposure.

i. Crimper, Blasting Cap: M2.

WARNING

CRIMPERS THAT CUT OR FAIL TO SECURE A BLASTING CAP ADEQUATELY TO THE FUSE SHOULD BE REMOVED FROM USE AND NEW CRIMPERS IMMEDIATELY REQUISITIONED.

Blasting cap crimper M2 is used to squeeze the shell of non-electric blasting cap around time blasting fuse, a standard base, or detonating cord securely enough to keep it from being pulled off but not tightly enough to interfere with the burning of the powder train in the fuse or the detonation of the detonating cord; a stop on the handle limits the closing of the jaws to prevent this. The crimper M2 forms a water resistant groove completely around the blasting cap; however, sealing compound should be applied to the crimped end of the blasting cap for use underwater. The rear portion of each jaw is shaped and sharpened for cutting fuse and detonating cord. One leg of the handle is pointed for use in punching cap wells in explosive materials for the easy insertion of blasting caps. The other leg has a screwdriver end. Cap crimper M2, being made of a soft nonsparking metal (which will conduct electricity), must not be used as pliers for any purpose, as this damages the crimping surface. Also, the cutting jaws must be kept clean and be used only for cutting fuse and detonating cord.

j. Cable, Power, Electrical. Electrical power cable is the two conductor, AWG No. 18 plastic-covered or rubber-covered type wire. It is used in making connections between electrically primed demolition charges and a source of power such as blasting machine or battery. It is used in 500-foot coils and is carried on cable reel (*n* below).

k. Holder, Blasting Cap: M8 (fig. 1-42). Blasting cap holder M8 is a metal clip designed to attach and hold a blasting cap to sheet explosive and is supplied with sheet demolition charges M118 and roll demolition charge M186. Three slanted protruding teeth secure holder to sheet explosive to prevent withdrawal. Two dimpled spring arms hold the blasting cap firmly in holder.

l. Knife, Pocket. The pocket knife consists of a 1 3/4-inch long cutting blade, a can opener, a punch, a combination bottle opener and screwdriver. It is equipped with a clevis on one end.

m. Pliers: Lineman's. The lineman's pliers with side cutters are 8-inches long.

n. Real, Cable. The cable reel is a metal spool 9-inches in diameter and about 8-inches wide. It has a capacity of 500 feet of 18-gage firing wire.

o. Reeling Machine, Cable, Hand. Hand cable reeling machine consists of the cable reel, a handle assembly, a crank, an axle and two carrying straps. The fixed end of the wire is extended from the spool through a hole in the side of the drum and fastened to two brass thumbnut terminals. Carrying handles are made of U-shaped steel rods. A loop at each end encircles a bearing assembly, which is a brass housing with a steel center to accommodate the axle. The crank is riveted to one end of the axle and a cotter pin is placed in the hole at the other to hold the axle in place.

p. Deleted.

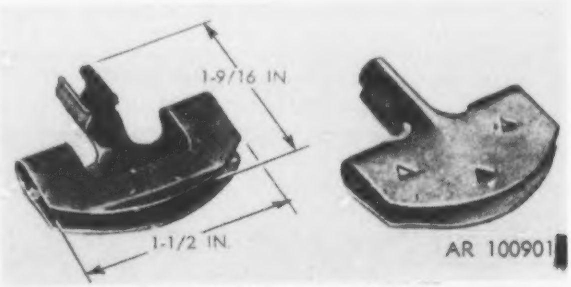


Figure 1-42. Blasting cap holder M8.

q. Tape, Pressure-Sensitive Adhesive. Pressure-sensitive tape is coated on both sides with pressure-sensitive adhesive and requires no solvent or heat to apply. It is available in rolls 2-inches wide and 72-yards long. The tape will not adhere to dirty, wet or oily surfaces and is not to be used when surface temperature of the target is below freezing. This tape is replacing adhesive paste M1 and is superior in speed and ease of application, as well as holding power. It is used to hold demolition charges to dry, clean wood, steel, or concrete.

r. Twine and Electrical Insulation Tape. Eight-ounce balls of No. 18 hemp twine and 82 1/2-inch rolls of 3/4-inch wide rubber-coated and impregnated black adhesive cotton electrical insulation tape are used to fasten caps to detonating cord, insulate electrical connections, fasten charges in place, tie or tape block demolition charges together into a compact package, and for miscellaneous uses.

s. Wire, Electrical. Solid, single conductor, waxed, double cotton wrapped, insulated annunciator, electrical wire No. 20 AWG is used in interconnecting blasting caps and in connecting blasting cap systems to firing cables. It is issued in 200-foot coils.

1-13. Demolition Kits and Sets

a. Demolition Kit, Bangalore Torpedo: M1-A1 and M1A2 (fig. 1-43). Bangalore torpedo demolition kits M1A1 and M1A2 consist of a group of 10 loading assemblies (torpedoes). The loading assemblies (torpedoes) are steel tubes 5-feet in length and 2⅛-inches in diameter, grooved, and capped at each end. All torpedoes have a threaded capwell at each end. Connecting sleeves and nose sleeves are provided in each kit. The torpedoes in kit M1A2 are identical to kit M1A1 except for differences listed in table 1-5. Bangalore torpedo demolition kits are used to clear paths through barbed wire entanglements and minefields. They clear a path 10-to 13-feet wide through barbed wire entanglements. In minefield breaching, they will explode all antipersonnel mines and most of the antitank mines in a narrow foot path. Many of the mines at the sides however may be shocked into a sensitive state, which makes extreme care necessary in any further mineclearing. Bangalore torpedoes have also been used successfully for clearing heavy undergrowth or bamboo.

Table 1-5. Characteristics of Bangalore Torpedoes

Type	Torpedo weight	Explosive per torpedo	Packaging
M1A1	Approx 13 lb	Aprox 9 lb amatol and TNT booster	One kit packed in box; total wt, 176 lb.
M1A2	Approx 15 lb	Approx 10.5 lb comp B4 and 1 lb comp A3 booster	One kit packed in wooden box; total wt, 198 lb.

b. Detonator Kit, Concussion: M1 (fig. 1-44).

(1) *General.* Concussion detonator kit M1 is essentially a mechanical firing device with a blasting cap attached. It is actuated by a detonation wave from a high-explosive blast. A number of demolition charges fitted with this type of firing device, in water or air, can be fired simultaneously when within range of the blast from an initiating charge or within range of each other, without connecting the demolition charges by detonating cord or other firing arangements. One kit is packed per metal container, 50 containers (50 kits) per wooden box. The weight of the box with contents is 59 pounds.

(2) *Description.* The kit consists of a firing mechanism, base plug (shipping plug), primed coupling base and blasting cap assembly, blue and yellow salt delay pellets, and pellet sleeve cover assembly.

(a) Firing mechanism. This mechanism consists of a circular body containing a bronze,

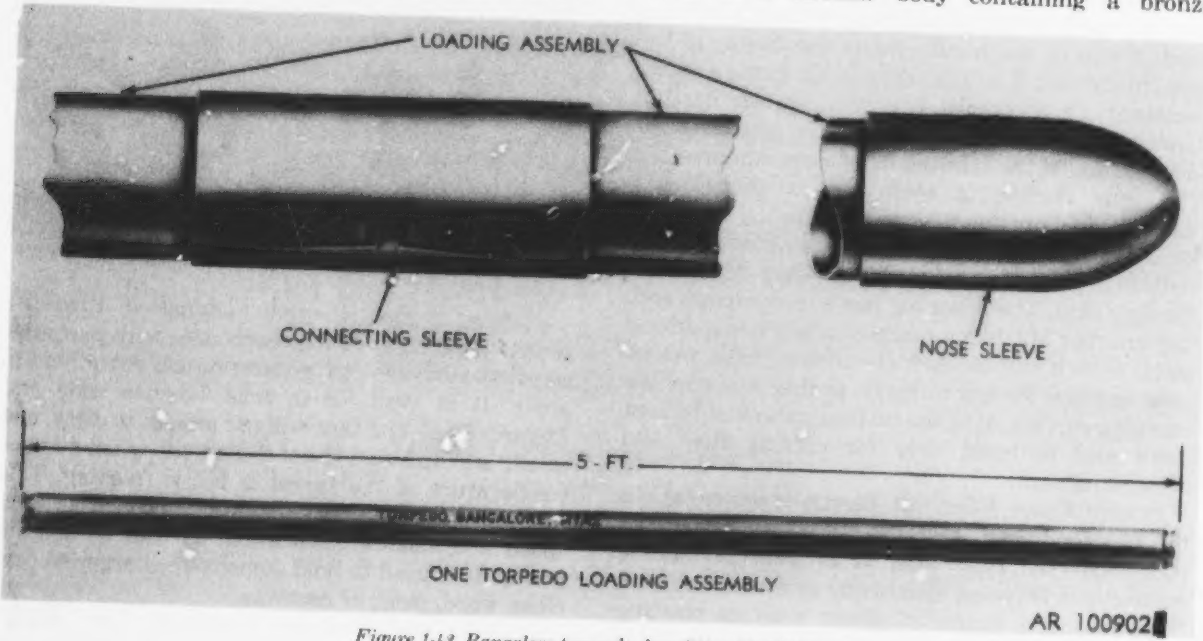


Figure 1-43. Bangalore torepedo demolition kit M1A2.

grill-protected, snap-type diaphragm which is in contact at its center with a spring loaded firing pin which is housed in a cylindrical projection integral with the body. The bronze diaphragm is protected by a sheet rubber diaphragm. A pellet sleeve, which projects from one side of the device, contains a metal spacer, a space for a salt delay tablet, and a sleeve plug. Before installation, the firing pin is restrained in its unfired position by a steel safety ball which is held in place against the beveled shoulder of the firing pin by the metal spacer in the pellet sleeve; the spacer is in turn held in place by a safety cotter pin. After removal of the safety cotter pin (air installation), or after the removal of the safety cotter pin and partial dissolution of the installed salt delay pellet (water installation), the firing pin is restrained in its unfired position only by a split firing pin release spring which engages a groove in the diaphragm end of the firing pin.

(*b*) *Base plug (shipping plug).* The base plug is a metallic plug which is assembled to the firing mechanism during storage and shipment.

(*c*) *Primed coupling base and blasting cap assembly.* This assembly consists of the same type metal coupling base with installed primer as used with firing devices but with a blasting cap assembled and sealed to it.

(*d*) *Salt delay pellets.* Two cylindrical, compressed salt delay pellets, one blue for 3½ ± ½-minute delay and one yellow for 7 ± 1 minute delay, are packed with the kit.

(*e*) *Pellet sleeve cover assembly.* This assembly consists of a paper tube crimped to a chipboard sleeve cover with a pull cord. It is assembled over the pellet sleeve covering the holes in the pellet sleeve in order to prevent the salt delay pellet from dissolving while the device is being installed underwater.

c. Demolition Sets. These sets are assemblies of demolition explosive items, accessories, and tools needed to accomplish and initiate almost all demolition projects. They are issued according to tables of organization and equipment (TOE).

(1) *Demolition equipment set, explosive initiating, electric and nonelectric* (fig. 1-45). The electric and nonelectric demolition set consists of TNT and composition C4 block demolition charges and demolition accessories and tools necessary for electric and nonelectric priming and firing. The set includes a wooden demolition chest for storage and transportation of the inert components. Paragraphs 1-11 and 1-12 contain information pertaining to items included in this set. The basic set consists of the items listed (*a*) and (*b*) below.

(*a*) *Components issued with basic set.* These items may be requisitioned separately for replacement purposes (SC 1375-95-CL-P02).

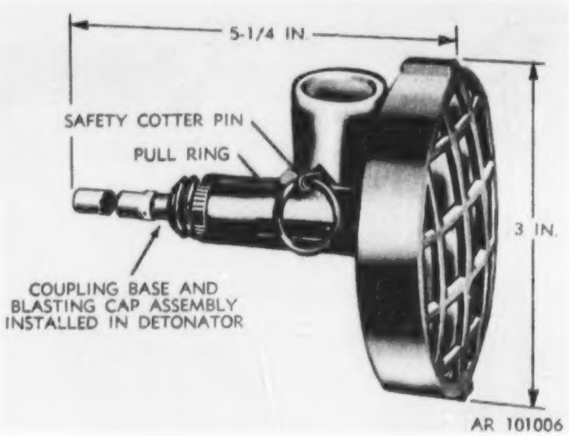

5-1/4 IN.
SAFETY COTTER PIN
PULL RING
3 IN.
COUPLING BASE AND BLASTING CAP ASSEMBLY INSTALLED IN DETONATOR
AR 101006

Figure 1-44. Concussion detonator kit M1.

Quantity	*Item*
2	BAG, CANVAS, CARRYING: Demolition equipment
1	BLASTING MACHINE: 10-cap capacity
1	BLASTING MACHINE: M32 [1]
1	BLASTING MACHINE: M34 [4]
5	BOX, BLASTING CAP, INFANTRY: 10-cap capacity
10	BOX, BLASTING CAP: plastic, 10-cap capacity [2]
1	CHEST, DEMOLITION: engineer platoon, M1931
2	CRIMPER, BLASTING CAP: M2
1	GALVANOMETER, BLASTING
2	KNIFE, POCKET
2	PLIERS: lineman's, with side cutter, length 8-in.
4	REEL, CABLE
1	REELING MACHINE, CABLE, HAND
2	TAPE MEASURING: self supporting english and metric 78.75-in.
1	TAPE MEASURING: ⅜-in. with nonmetallic 100-ft lg
1	TEST SET, BLASTING CAP: M51 [3]

---

[1] Use when stocks on 10-cap capacity blasting machine are exhausted.

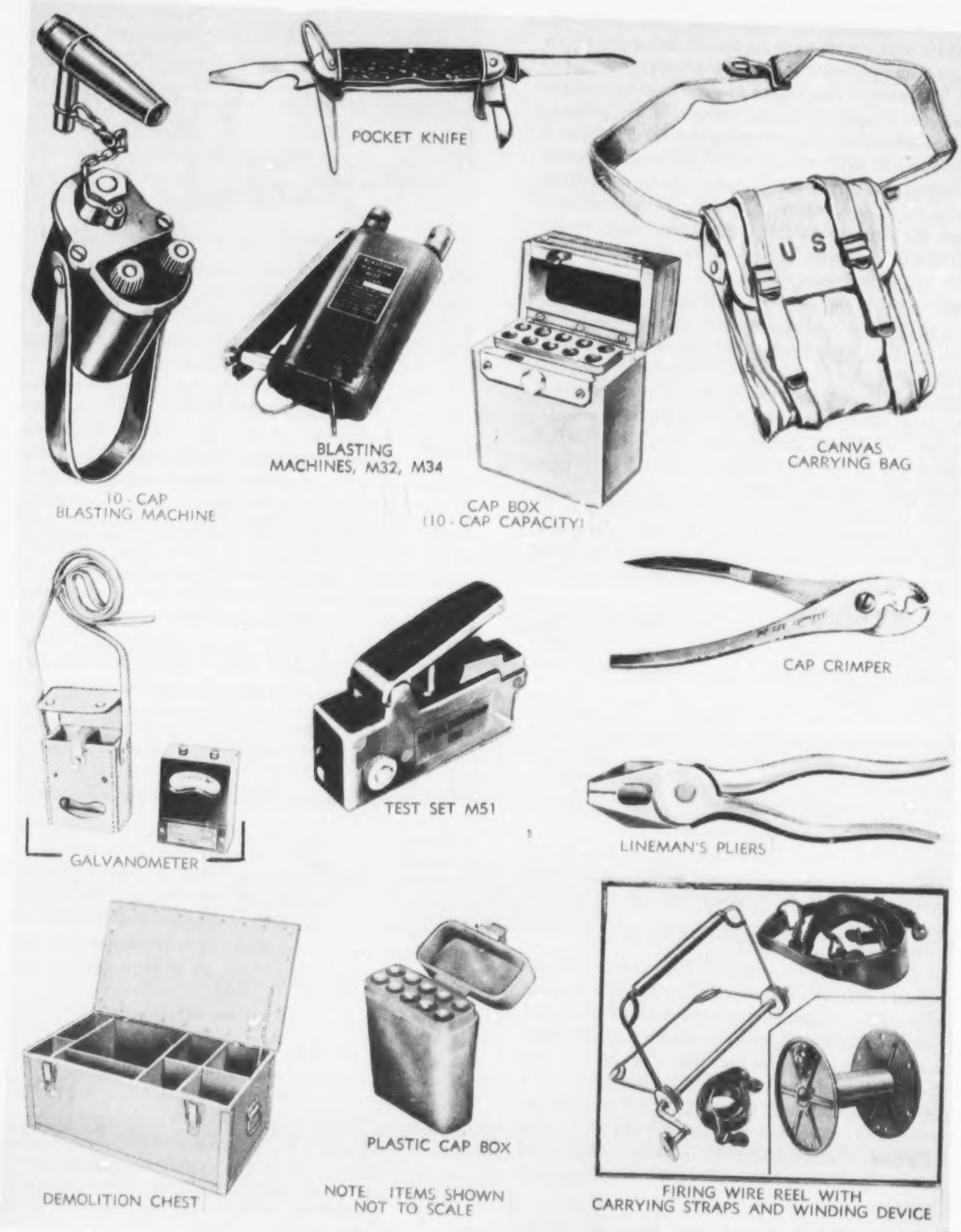
[2] Use when stocks on infantry cap box are exhausted.

[3] Use when stocks on blasting galvanometer are exhausted.

[4] Use when stocks of M32 blasting machines are exhausted.

(*b*) *Components issued separately.* The following items are required to complete the demolition set and should be on hand at all times. These items are not supplied with the set and must be requisitioned separately (SC 1375-95-CL-P02).

Quantity	*Nonexplosive Components* *Item*
100	ADAPTER, PRIMING: M1A4
2	ADHESIVE, CHARGE, DEMOLITION
1	BATTERY, DRY: 2-term stud nut type cylindrical shape; BA-245/U
1	BATTERY, DRY: 2-term stud nut type cylindrical shape; BA 2245/U
4	CABLE, POWER, ELECTRICAL: firing, 500-ft coil
100	CLIP, CORD, DETONATING: M1
2	COMPOUND: sealing blasting cap, waterproof, ½-pint can
50	HOLDER, BLASTING CAP
50	HOLDER, BLASTING CAP: M8



AR 101004-B

Figure 1-45. Electric and nonelectric explosive initiating demolition equipment set.

Quantity	*Nonexplosive Components* *Item*
6	INSULATION TAPE, ELECTRICAL: adhesive, ¾-in. w, 66-ft r
2	TAPE, PRESSURE-SENSITIVE ADHESIVE: plastic backing 2-in. w, 72-yd 1, 2 r [1]
2	TAPE, PRESSURE-SENSITIVE ADHESIVE: cloth backing 1 in. w, 60 yd r
2	TWINE: hemp, No. 18, 1-lb ball
2	WIRE, ELECTRICAL: AWG No. 20, 200-ft coil

[1] Deleted

[2] Use when stocks on blasting cap holder are exhausted.

Quantity	*Explosive Components* *Item*
50	CAP, BLASTING: electric, M6
50	CAP, BLASTING: nonelectric, special, J-1
50	CAP, BLASTING: nonelectric, M7 [1]
40	CHARGE, DEMOLITION: block, M5A1
80	CHARGE, DEMOLITION: block, M112, 1¼-lb, comp C4 [2]
20	CHARGE, DEMOLITION: M118, 2¼-lb
20	CHARGE, DEMOLITION: roll, M186 [3]
50	CHARGE, DEMOLITION: block, 1-lb, TNT
5	CORD, DETONATING: fabric backing reinforced, 100-ft spool
3	CORD, DETONATING: plastic backing, olive drab 1000-ft spool
5	DESTRUCTOR, EXPLOSVE: universal, M10
2	FUSE, BLASTING, TIME: M700, 50-ft coil
50	IGNITER, TIME BLASTING FUSE: M2
50	IGNITER, BLASTING FUSE: M60 [4]

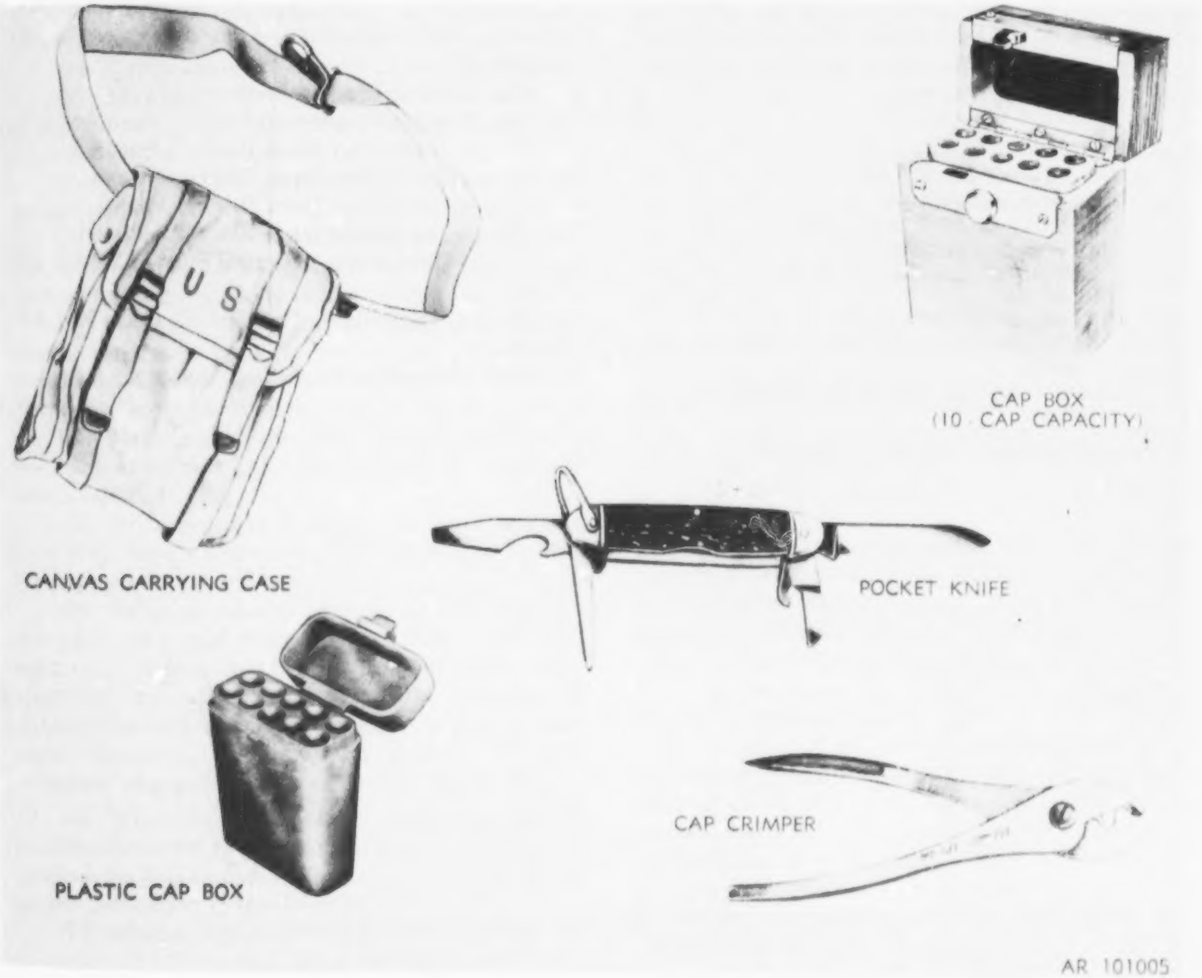
[1] Use when stocks on special nonelectric blasting cap J-1 are exhausted.

[2] Use when stocks on block demolition charge M5A1 are exhausted.

[3] Use when stocks on block demolition charge M118 are exhausted.

[4] Use when stocks on time blasting fuse igniter M2 are exhausted.

(2) *Demolition equipment set, explosive initiating, nonelectric* (fig. 1-46). The nonelectric demolition



AR 101005

Figure 1-46. Nonelectric explosive initiating demolition equipment set.

set consists of composition C4 block demolition charges and the demolition tools and accessories needed for nonelectric priming and firing. Paragraphs 1-11 and 1-12 contain information pertaining to items included in this set. This basic set consists of the items listed in (*a*) and (*b*) below.

(*a*) *Components issued as basic set*. These items may also be requisitioned separately for replacement purposes (SC 1375-95-CL-P02).

Quantity	*Item*
2	BAG, CANVAS, CARRYING: demolition equipment
2	BOX, CAP, INFANTRY: 10-cap capacity
2	BOX, BLASTING CAP: plastic, 10-cap capacity [1]
2	CRIMPER, BLASTING CAP: M2
2	KNIFE, POCKET
2	TAPE MEASURING: self supporting english and metric 78.75-in.
1	TAPE MEASURING: ⅜ w nonmetallic, 100 ft spool

---

[1] Use when stock of infantry cap box is exhausted.

(*b*) *Components issued separately*. The following items are required to complete the demolition set and should be on hand at all times. These items are not supplied with the set, and are to be requisitioned separately (SC 1375-95-CL-P02).

Quantity	*Nonexplosive Components* *Item*
20	ADAPTER, PRIMING: M1A4
2	ADHESIVE, CHARGE, DEMOLITION
100	CLIP, CORD, DETONATING: M1
2	COMPOUND: sealing, blasting cap, waterproof, ½-pint can 66-ft r
50	HOLDER, BLASTING CAP: M8
2	INSULATION TAPE, ELECTRICAL: adhesives, ¾-in. w, 66-ft r
1	TAPE, PRESSURE SENSITIVE ADHESIVE: 2-in. w, 72-yd r [1]

---

[1] Use when stocks on paste adhesive M1 are exhausted.

Quantity	*Explosive Components* *Item*
50	CAP, BLASTING: special nonelectric J-1
50	CAP, BLASTING: nonelectric, M7 [1]
40	CHARGE, DEMOLITION: block, M5A1
80	CHARGE, DEMOLITION: block, M112, 1¼-lb, comp C4 [2]
5	CORD, DETONATING: reinforced, 100-ft spool
2	DESTRUCTOR, EXPLOSIVE: universal, M10
2	FUSE, BLASTING, TIME: M700, 500-ft coil
50	IGNITER, TIME BLASTING FUSE: M2 [3]
50	IGNITER, TIME BLASTING FUSE: M60

---

[1] Use when stocks on special blasting cap J-1 are exhausted.

[2] Use when stocks on block demolition charge M5A1 are exhausted.

[3] Use when stocks on time blasting fuse igniter M2 are exhausted.

1-14. Inert Demolition Items

Inert demolition items are used for training or lecture aids; they simulate live demolition items except they do not contain explosives. Descriptions of live demolition items which have inert counterparts are contained in paragraphs 1-6 through 1-11, as applicable. The following inert demolition items are listed in SC 1340/98-IL:

Cap, Blasting, Electric, Inert
Cap, Blasting, Nonelectric, Inert
Charge, Demolition: Inert, Block, ¼-Pound
Charge, Demolition: Inert, Block, ½-Pound
Charge, Demolition: Inert, Block, 1-Pound
Charge, Demolition: Inert, Block, 2½-Pound
Charge, Demolition, Practice: Shaped M2A3, 15-Pound
Charge, Demolition, Practice: Shaped, M3, 40-Pound
Cord, Detonating: Reinforced, Dummy

Cord, Detonating: Inert, Fuse, Primacord
Detonator, Friction: Inert, M1A1
Detonator, Friction: Inert, M1A2
Firing Device, Demolition: Inert M1, Pull-type
Firing Device, Demolition: Inert M1, Pressure-type
Firing Device, Demolition: Inert, M3, Pull-release-type
Firing Device, Demolition: Inert, M5, Pressure-release-type
Fuse, Blasting Time: Inert, Safety
Igniter, Time Blasting Fuse: Inert, M2, Weatherproof

Section III. SAFETY, CARE, AND HANDLING

1-15. Safety

a. General Precautions. Observe precautions generally applicable to use of ammunition and comply with all regulations and local and unit standard operating procedures. For safety rules, demolition mission responsibilities, and safe distance from personnel per pounds of explosive, refer to *e*(3) below.

b. Special Precautions in Use. In using the shaped demolition charges, the precautions in (1) through (8) below should be observed.

(1) Center charge over point to be attacked.

(2) Set axis of the charge in line with the direction of the hole desired. If the target is other than horizontal, tie, tape or prop the charge in place.

(3) Use the legs or pedestal provided to obtain the proper stand-off.

(4) Be certain there is no obstruction in the conical cavity or between the charge and target, as any obstruction will materially reduce penetration effect.

(5) Although the principal effect of a shaped demolition charge is in its piercing jet, considerable blast and fragmentation effect will be produced in all directions, especially directly opposite the direction of the jet. Personnel in the open should withdraw a minimum of 900 feet. If adequate cover is provided, 300 feet is sufficient.

(6) Since pentolite is somewhat more sensitive than TNT, handle with appropriate care shaped demolition charges containing pentolite.

(7) In using several charges at one time, do not place 15-pound charges closer than 5 feet from each other unless they can be fired simultaneously, that is, by approximately equal lengths of detonating cord detonated by a single cap or main cord. Similarly, the minimum distance between 40-pound charges should not be less than 8 feet.

(8) When shaped demolition charges are used to blast boreholes for two stage demolitions, exercise care to allow the hole to cool sufficiently before loading the second demolition charge over the hole.

(9) Blasting caps are a unique hazard because they are easier to initiate than other demolition materials. Both electric and non-electric caps can be initiated by impact. The open end of non-electric caps contains an especially sensitive material (see WARNINGS in para 2-2). Electric caps can also be initiated by static electricity or induced current from radio frequency transmissions (see para 2-9). Just by itself a detonating cap is a dangerous personnel hazard. Detonated in the hand, a single cap can pretty much destroy a person's hand. Detonated in the open, a cap produces many tiny fragments from its metal shell and can propel them and small stones, etc., a considerable distance. These tiny pieces of material are an eye hazard beyond the distance where the blast from the cap would have any effect on personnel. Exposed personnel are considered safe from the blast effects of a single cap at 50 feet but approved eye protection must be worn at this distance and far beyond because of the fragments and other material propelled by the caps detonation. For these reasons when detonating blasting caps during training operations it is advisable that blasting caps be covered with sand bag(s) or detonated behind a protective shield.

c. Poisonous Fumes.

(1) The detonation or burning of all explosives produces poisonous fumes. The chemicals used in explosives are posionous. Personnel should be cautioned against inhaling fumes or ingesting explosives. When explosives are used in closed areas or underground, adequate time must be allowed for the fumes to dissipate before investigation. Explosives should be carefully controlled to prevent diversion to other than the intended purpose; i.e., burning as a source of heat for cooking.

(2) Since explosives contain their own oxidizer, burning explosives cannot be extinguished by smothering. Whenever explosives burn, there is a hazard of possible detonation. Personnel should not attempt to extinguish burning explosives without professional advice and assistance and should keep their distance because of the toxic fumes.

d. Misfires. A misfire is a complete failure to function. Working on or near a misfire is the most hazardous of all blasting operations. Investigation and correction should be undertaken only by the man who placed the charge. A misfire should be extremely rare if the procedures in chapter 2 are followed closely. Detailed procedures for clearing misfires are contained in paragraphs 2-3*b*, 2-8*b*, and 2-12.

e. Safe Distance From Demolitions.

(1) *Blast effect.* Generally, the greater danger to personnel is the missiles thrown by the explosion. Blast effect (the increase in air pressure) is a hazard even

though special protective features are used at detonation or demolition sites to eliminate or confine missiles and provide for detonation of charges close to personnel. Personnel provided the minimum protection prescribed in (3) below will not generally be endangered by blast effects.

(2) *Missile hazard.* Explosives can propel lethal missiles great distances. How far an explosion-propelled missile will travel in air depends primarily upon relations between weight, shape, density, initial angle of projection, and initial speed. The missile hazard from steel-cutting charges extends a greater distance under normal conditions than that from cratering, quarrying, or surface charges of bare explosives.

(3) *Safe distances.* The following criteria give the missile hazard distances at which personnel in the open are relatively safe from missiles created by bare charges placed in or on the ground, regardless of type or condition of the soil (AR 385-63). For charges ranging from 27 to 425 pounds, the distance in meters at which personnel in the open are relatively safe from missiles can be calculated as follows:

$$D = 100\sqrt[3]{P}$$

where

P = Pounds of Explosive

D = Safe Distance in Meters

***D equals 100 times the cube root of the weight of explosives.**

Safe distances calculated for selected charge weights are given in table 1-6.

Table 1-6. Minimum Safe Distance For Personnel In The Open

Pounds of explosive	Approximate safe distance	
	meter	feet
1. to 27	300	900
30	311	930
35	327	980
40	342	1,020
45	356	1,070
50	369	1,100
60	392	1,170
70	413	1,240
80	431	1,290
90	449	1,330
100	465	1,390
125	500	1,500
150	534	1,590
175	560	1,680
200	585	1,750
225	609	1,820
250	630	1,890
275	651	1,950
300	670	2,000
325	688	2,070
350	705	2,100
375	722	2,160
400	737	2,210
425 and over	750	2,250

1-16. Care and Handling

a. Explosive demolition materials must be handled with appropriate care at all times. The explosive elements in primers, blasting caps, and fuzes are particularly sensitive to shock and high temperatures.

b. Personnel should be trained to handle all demolition items and components, including practice and training items, as potentially dangerous, even though the items have been designated *INERT*. The same basic safety rules should be followed when using inert training or lecture aids as those when loaded items are being used. Striking, dropping, or handling in other than the manner prescribed for explosive loaded (live) items should not be permitted. In order to make inert items readily identifiable, sometimes several holes are drilled or cut in them where practicable. In addition, they are stamped and/or stenciled *INERT* if they have no explosive filler and *PRACTICE* if they contain an inert or low-explosive filler. Inert and practice demolition items are painted light blue with white lettering. Practice demolition items with a low-explosive filler have a brown band. Older inert items are painted black with white lettering.

c. In order to keep explosive demolition materials in a serviceable condition and ready for immediate issue and use, the general rules in (1) through (5) below apply.

(1) Store explosive demolition materials in the original containers in a dry, well-ventilated place protected from the direct rays of the sun and other sources of excessive heat. Keep sensitive initiators such as primers, blasting caps, fuses, and igniters separate from other explosives.

(2) Keep all demolition materials and containers clean, dry, and protected from possible damage.

(3) Disassembly of explosive components, without specific authorization, is strictly prohibited.

(4) Do not open sealed containers or remove protective safety devices until just before use.

(5) All demolition material prepared for firing but not fired must have protective safety devices installed before returning to original packing. Mark packing appropriately.

d. For more detailed information on care, handling, preservation, and safety-distance requirements, refer to TM 9-1300-206.

CHAPTER 2
OPERATING INSTRUCTIONS

Section 1. OPERATING PROCEDURES

2-1. General

This section contains operating procedures for the two types of firing systems in use (electric and nonelectric) and methods for priming charges. Also included are operating procedures for detonators, explosive destructors, fuse igniters, and firing devices which may be used for special applications in the field.

2-2. Nonelectric Firing System

A nonelectric system (fig. 2-1) is one in which an explosive charge is prepared for detonation by means of a nonelectric blasting cap. The basic materials consist of a nonelectric blasting cap, which provides the shock adequate to detonate the explosive, the time blasting fuse, which transmits the flame that fires the blasting cap, and a means of igniting the time fuse. If more than one charge must be detonated simultaneously, the nonelectric system must be combined with detonating cord (paras 2-10 through 2-12) to ensure simultaneous firing.

NOTE

A nonelectric priming system will normally be assembled in the field at the demolition site. Under some circumstances, if desired, some subassembling may be done in advance in order to save time or to avoid exposing components to rain etc. When it is desired to have the assemblies prepared more than a few hours in advance, use blasting cap sealant to waterproof the fusecap joint. This sealant will protect the fusecap joint for an indefinite period of time. The assembly will be treated as a blasting cap for storage and transportation (e.g., keep separate from other explosives). When using waterproof time blasting fuse igniter M60, it may be assembled to the blasting fuse and cap prior to insertion into the cap well of the explosive, IF the safety pin is still installed.

Inspect M2 crimpers to ensure the stop is at least 1/16-inch high. Inspect the nut on M-2 crimper to ensure it is well staked to bolt to prevent removal of nut thus loosening the jaws. If the nut is not staked in the bolt that holds the crimper together, the crimper can come apart while being used. Too short a bolt can cause the same thing to happen. Turn in defective crimpers for replacement or tighten nut and restake it using a hammer and chisel, to assure it cannot come loose

Inspect M2 Crimper jaws for elongated, oval or egg-shaped opening, when they're closed. Inspect crimping jaws and cutting jaws for dull or jagged edges. If jaws of blasting cap crimper form an elongated, oval or egg-shaped opening when closed, a misfire can occur by squeezing the cap too tightly around the fuse; likewise, if the jaws have dull or jagged cutting edge.

Assemble a nonelectric system as instructed in a through l below.

WARNING

A rough jadded cut fuse inserted into a blasting cap can cause a misfire. If the rough cut is due to an unserviceable crimper M2, requisition a serviceable crimper. If a serviceable crimper is not available, use a sharp knife to cut the fuse. To assure that the fuse is cut square when using the knife, cut fuse against a solid surface such as wood.

a. Using crimper M2, cut and discard a 6-inch length from free end of time blasting fuse to prevent a misfire caused by exposed powder absorbing moisture from the air (A, fig. 2-2).

b. Cut off a three-foot length of time blasting fuse to check burning rate.

c. Ignite fuse with a fuse igniter (see para ((1), (2) and (3) below), if available, or cut a slit near one end of fuse, insert a match head into split, and light match (fig. 2-3).

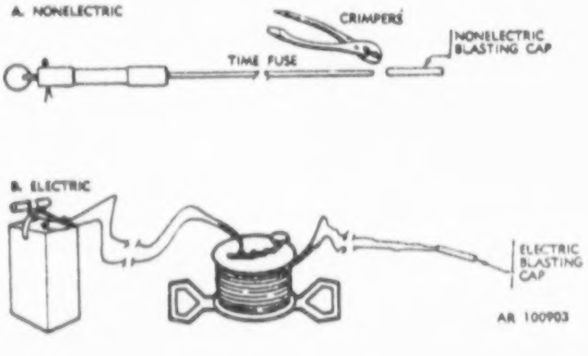
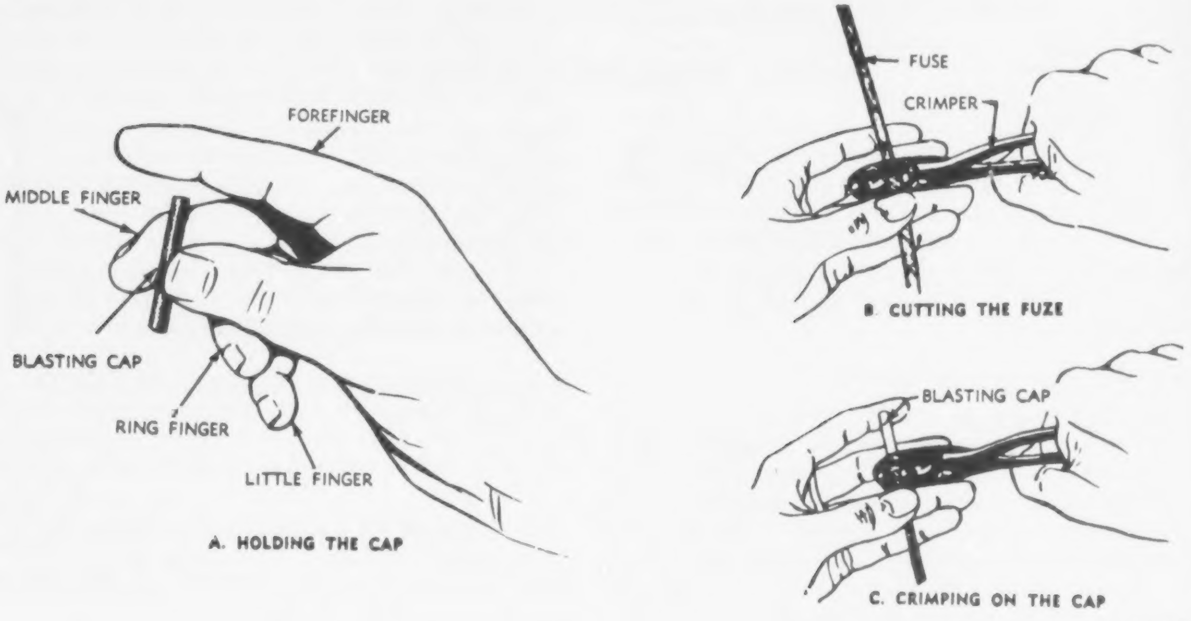
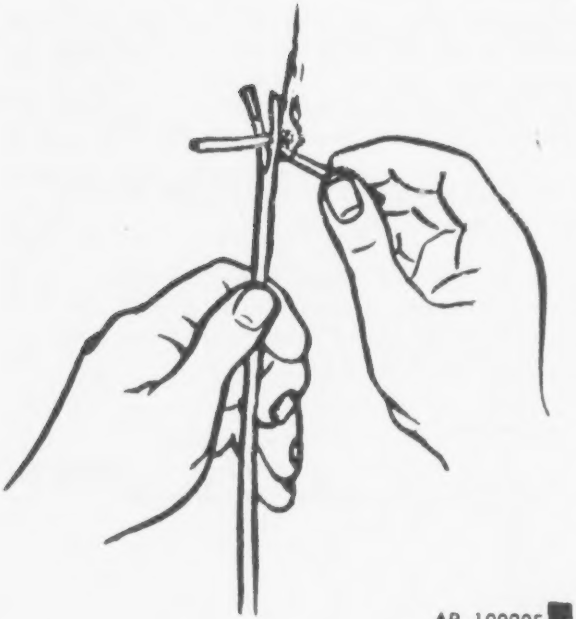


Figure 2-1. Initiation systems.



AR 100904

Figure 2-2. Holding, cutting and capping time blasting fuse.



AR 100905

Figure 2-3. Lighting time blasting fuse with match.

d. Note the time it takes for fuse to burn.

e. Compute burning rate per foot by dividing time in seconds by length in feet.

f. Cut time blasting fuse long enough to permit the person detonating the charge to reach a safe distance by walking at a normal pace before the explosion.

g. Pass end of time blasting fuse through priming adapter (fig. 2-4).

h. Take one nonelectric blasting cap (fig. 1-15) from cap box.

WARNING

Foreign matter in a blasting cap may cause a misfire. If foreign matter is to be removed from a nonelectric blasting cap, do not tap cap with a hard object or against a hard object. Never blow into cap. Do not insert anything into cap to remove any dirt or foreign material.

i. Inspect nonelectric blasting cap by looking into the open end. If any foreign matter or dirt is present, follow procedure below:

(1) Hold cap, near open end, between thumb and middle finger, of one hand (fig. 2-2).

(2) Aim open end of cap at palm of second hand.

(3) Gently bump wrist of one hand against wrist of other hand.

(4) If foreign matter does not come out, dispose of cap in accordance with local regulations.

WARNING

Forcing a time fuse into a blasting cap by twisting or other means may cause cap to explode. Do not force time fuse into blasting cap.

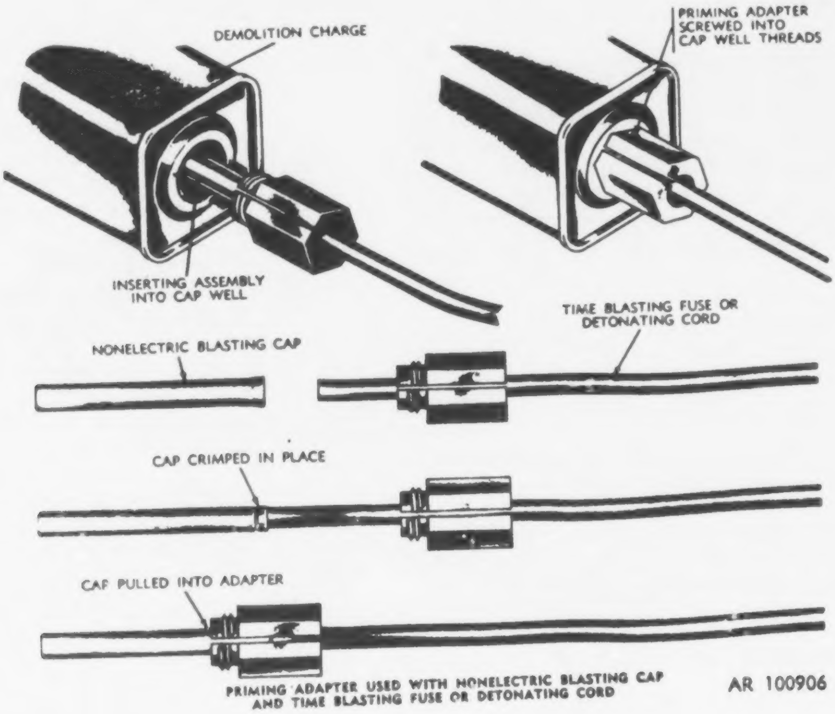

DEMOLITION CHARGE
PRIMING ADAPTER SCREWED INTO CAP WELL THREADS
INSERTING ASSEMBLY INTO CAP WELL
TIME BLASTING FUSE OR DETONATING CORD
NONELECTRIC BLASTING CAP
CAP CRIMPED IN PLACE
CAP PULLED INTO ADAPTER
PRIMING ADAPTER USED WITH NONELECTRIC BLASTING CAP AND TIME BLASTING FUSE OR DETONATING CORD
AR 100906

Figure 2-4. Priming adapter M1A4 with nonelectric cap and time blasting fuse or detonating cord.

WARNING

Contact between cap end of time fuse and moist fingers or other damp objects can cause a misfire.

j. Hold time blasting fuse vertically with square cut end up and slip blasting cap gently down over it so that ignition charge in cap is in contact with end of time fuse; if not in contact, it may misfire. If end is flattened or if it is too large to enter blasting cap freely, roll time fuse between thumb and fingers until size is reduced to permit free entry.

k. After blasting cap has been seated, grasp time blasting fuse between thumb, ring, and little finger of less favored hand (left or right) and place forefinger over closed end of cap to hold it firmly against end of time fuse. Keep a slight pressure on closed end of cap with forefinger (C. fig. 2-2).

l. Slide middle finger down outer edge of blasting cap to guide crimper (C. fig. 2-2), and thus obtain accurate crimping, even in darkness, since finger can be used to locate open end of blasting cap.

WARNING

- **Crimpers are equipped with fuse cutter; make certain cutting section is not used during crimping operation. A crimp too near the explosive in blasting cap may cause detonation. Do not crimp cap more than 1/4-inch from open end.**
- **When crimping a cap, do not point cap toward other personnel or explosives.**

m. Extend arms, point cap out and away from body (fig. 2-5), and crimp cap at a point 1/8 to 1/4 inch from open end.

NOTE

Should cap have to remain in place several days before firing, protect joint between cap and time blasting fuse with coating of sealing compound or similar substance. Because this sealing compound (para 1-2b(3)) does not make a permanent waterproof seal, submerged charges should be fired immediately.

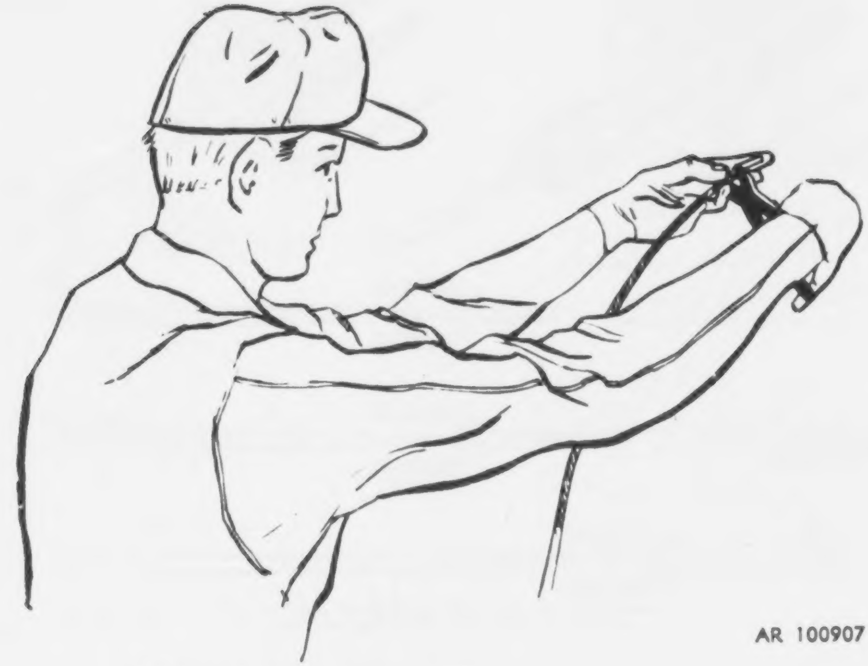

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Figure 2-5. Proper position for crimping blasting cap

n. Deleted.

o. Attach time blasting fuse igniter as follows:

(1) *Weatherproof time blasting fuse igniter M60* (para 1-11*h*(3)).

(a) Unscrew fuse holder cap of fuse igniter (fig. 1-36) two or three turns but do not remove.

(b) Press shipping plug into igniter to release it, and rotate plug to remove it from igniter.

(c) Insert free end of time fuse as far as possible into cavity created by removal of shipping plug.

(d) Tighten cap hand-tight to hold fuse in place to weatherproof joint.

NOTE

The double action required to fire an M60 allows it to be safely attached to a capped fuse prior to priming of a charge. The assembly should be treated as a blasting cap for storage and transportation (e.g., kept separate from other explosives). Since crimping a cap onto M700 Fuse does not produce a really watertight seal, the assembly could be affected by exposure to moisture or even high humidity for several hours. If it is desired to have the assemblies prepared more than a few hours before use, it would be advisable to use blasting cap sealant to waterproof the fuse-cap joint. If the joint is so protected, it could be kept indefinitely before use.

(e) Deleted.

(f) Deleted.

(2) *Weatherproof time blasting fuse igniter M2* (para 1-11*h*(2)).

(a) Insert free end of time blasting fuse into igniter (fig. 1-35) as far as it will go. It is held in place by a pronged fuse retainer.

(b) Deleted.

(3) *Friction time blasting fuse igniter M1* (para 1-11*h*(1)).

(a) Insert free end of time blasting fuse into igniter (fig. 1-34) as far as it will go. It is held in place by a pronged fuse retainer.

(b) Carefully place priming adapter over blasting cap until it stops, insert into cap well of explosive, and screw adapter into place. If no priming adapter is available, insert blasting cap into cap well and tie it in place with a string or fasten it with tape or similar available material. (Refer to para 2-17 for nonelectric priming of block demolition charges.)

p. **Light time blasting fuse as follows:**

WARNING

If temperature of fuse igniter M60 exceeds 160° F., igniter may rupture on functioning. Wear gloves to prevent injury.

NOTE

Most people find it uncomfortable to hold an object whose temperature is over 140°F in their hand for more than a few seconds. Therefore, any igniter which cannot be held comfortably could be near the critical temperature (160°F) and should be functioned only while wearing a glove.

(1) *Time blasting fuse igniter M60.*

(a) To fire, hold barrel in one hand and remove safety pin. Grasp pull ring and push in and rotate to insure igniter is set. Take up slack before making the final strong pull to fire igniter.

(b) In event of misfire, fuse igniter can be reset quickly without disassembly by pushing plunger all the way in and attempting to fire as before. (It cannot be reset underwater, however, because water can enter the interior of the nylon case through the vent hole in the pull rod.)

(2) *Time blasting fuse igniter M2.* To fire, hold barrel in one hand and pull on pull ring with other hand.

(3) *Friction time blasting fuse igniter M1.* To fire, hold tube in one hand and pull on pull handle with other hand.

(4) *Matches.* If a fuse igniter is not available, light time blasting fuse with a match by splitting fuse at end (fig. 2-3), placing head of an unlighted match in powder train, and lighting inserted match head with flame from another match or cigarette lighter.

q. After lighting time blasting fuse, take cover.

2-3. Nonelectric Misfires

WARNING

Working on or near a misfire is the most hazardous of all blasting operations. A misfire cannot be immediately distinguished from a delay in function. Do not handle suspected misfires until after required waiting period has elapsed and other safety precautions have been accomplished.

a. Prevention. A misfire should be extremely rare if these procedures are followed closely:

(1) Prepare and place all components of priming systems, as required, following step-by-step procedures.

(2) Load charges carefully.

(3) Perform any tamping operation with care to avoid damage to charges.

(4) Fire charge according to proper technique.

(5) Use dual firing systems (paras 2-13 — 2-16). If both systems are properly assembled, the possibility of a misfire is reduced to a minimum.

(6) Do not use blasting caps underground; use detonating cord.

b. Clearing of Nonelectric Misfires. Occasionally, a nonelectric misfire will occur. Investigation and correction should be undertaken only by the man who placed the charge. For a charge primed with a nonelectric cap and time blasting fuse, the procedure is as follows:

(1) Delay investigation of misfire at least *30 minutes* after expected time of detonation. This should be ample time for any delayed explosion to take place because of a defective powder train in the fuse or burning charge. Under certain combat conditions, however, immediate investigation may be necessary.

(2) If misfired charge is not tamped, lay a primed 1-pound charge at side of misfired charge without moving or disturbing it, and fire.

(3) If misfired charge has no more than a foot of tamping, attempt to explode it by detonating a new 2-pound charge placed on top.

(4) If the misfired charge is located in a tamped borehole, or if placement of tamped charge makes method (3) above, impractical, follow either procedure listed below.

WARNING

Digging into charge may initiate charge. Check on depth and direction of borehole during digging to minimize danger of striking charge or placing a new charge too far away to induce detonation.

(*a*) *Procedure No. 1.*

1. Carefully remove tamping by metallic or nonsparking tools or, if available, by a stream of compressed air or water.

2. Dig until charge is within one foot of being uncovered.

3. Insert a new, primed 2-pound charge on top of misfired charge.

4. Detonate new 2-pound charge. Whenever possible, detonating cord should be used to prime either underground or aboveground charges (paras 2-10 through 2-12).

(*b*) *Procedure No. 2.*

1. Carefully dig a new hole to within one foot and to the same depth as old hole.

2. Place a new, primed 2-pound charge in new hole.

3. Detonate new, primed 2-pound charge. Follow instructions listed in (*a*)4 above.

2-4. Electric Firing System

WARNING

When handling electric blasting caps, do not hold the explosive end of the cap, hold the end of the cap which is connected to the lead wires.

a. General. An electric firing system (B, fig. 2-1) is one in which electricity is used to fire the primary initiating element. An electric impulse supplied from an electric blasting machine travels through the firing wire and cap lead wires to fire an electric blasting cap. The chief components of the system are the electric blasting cap, firing wire, and the blasting machine. The preparation of the explosive charge for detonation by electric means is called electric priming. The proper methods and sequence of operation of electric priming are described below in detail and summarized in table 2-1.

WARNING

Blasting machine will not be connected to firing wires until completion of prefiring tests and until ready for firing.

b. Precautions.

(1) *Two or more caps.* If two or more electric blasting caps are connected in same circuit, be sure that they are of same type and made by same manufacturer (except for blasting cap M6. Refer to 1-11*a*(1)(*a*) and (*b*)).

Table 2-1. Outline (Checklist) of Basic Electric Blasting (Setup and Firing)

1. Check circuit test instrument.
2. Install charges—do not install electric blasting caps—any nonelectric priming may be done.
3. Check firing wire continuity.
4. Short firing site end of firing wire leads.
5. Lay firing wire.
6. Check firing wire continuity again.
7. Electrically check each blasting cap.
8. Connect blasting caps in desired arrangement but NOT to firing wire. Do not install caps in charges yet.
9. Keeping away from caps, check for RF induced currents by connecting cap circuit to firing wire.
10. Install caps in charges and assure blast area is clear of personnel.
11. Retire to firing site.
12. Unshort firing wire leads and electrically check completed blasting circuit.
13. Exercise blasting machine.
14. When ready to fire, attach firing wire leads to blasting machine.
15. Actuate blasting machine.

(2) *Firing the circuit.* For safety reasons, only one individual must be detailed to connect blasting machine to firing circuit and to fire the circuit. He must be responsible for care and security of the blasting machine at all times during blasting activities. He also should either connect the blasting wires in the circuit or check their connection by on-the-spot visual examination.

c. Placing Charges. Prepare and place all explosive charges as prescribed by methods in FM 5-25.

d. Laying Firing Wire.

(1) After locating a firing position a safe distance away from charges, (ref para 5-2 FM 5-25), lay out firing wire from charges to firing position.

(2) Test firing wire as described in paragraph 2-7*a*.

(3) Twist free ends of firing wire together at firing position to prevent a static electric charge from building up in firing wire.

e. Testing Blasting Caps.

(1) Test each blasting cap to be used in electric firing system as described in paragraph 2-7*b*.

(2) After each cap has been tested, twist free ends of cap lead wires together or shunt them with short circuit shunt to prevent an electric charge from building up in cap lead wires.

f. Connecting Series Circuit.

(1) If two or more electric blasting caps are used, connect their lead wires into one of the two series circuits described in paragraph 2-6.

(2) If two or more blasting caps are used in series circuit, circuit should be tested by connecting free ends of blasting caps leads to blasting cap test set M51 or galvanometer (para 2-7*b*).

NOTE

At firing position, keep free ends of firing wire twisted together until ready to connect to blasting machine.

g. Splicing Wires.

(1) Splice one of the free cap lead wires to a firing wire conductor (para 2-5).

WARNING 1

Induced currents from radio frequency (RF) sources can initiate blasting caps connected to long lead of wire (para 2-9*a*). Do not insert caps into charges until after closed circuit of caps and firing wire has been safety-tested for RF induced current.

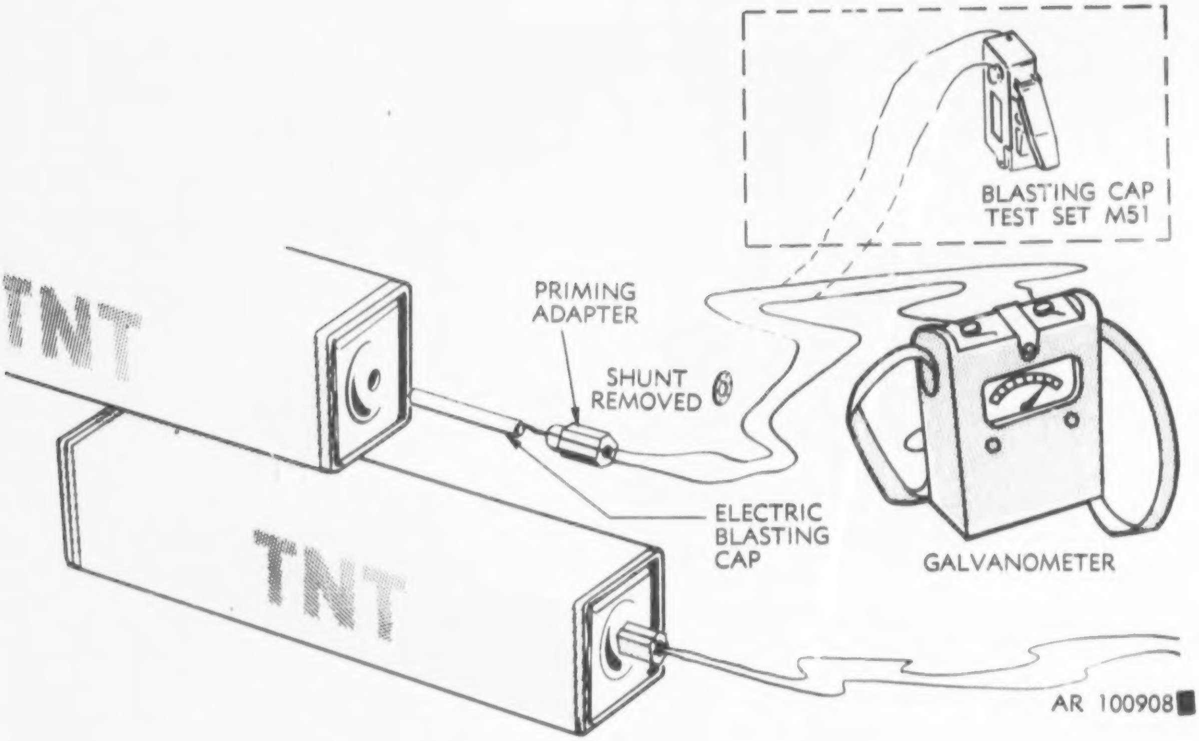

Figure 2-6. Assembling electric primer.

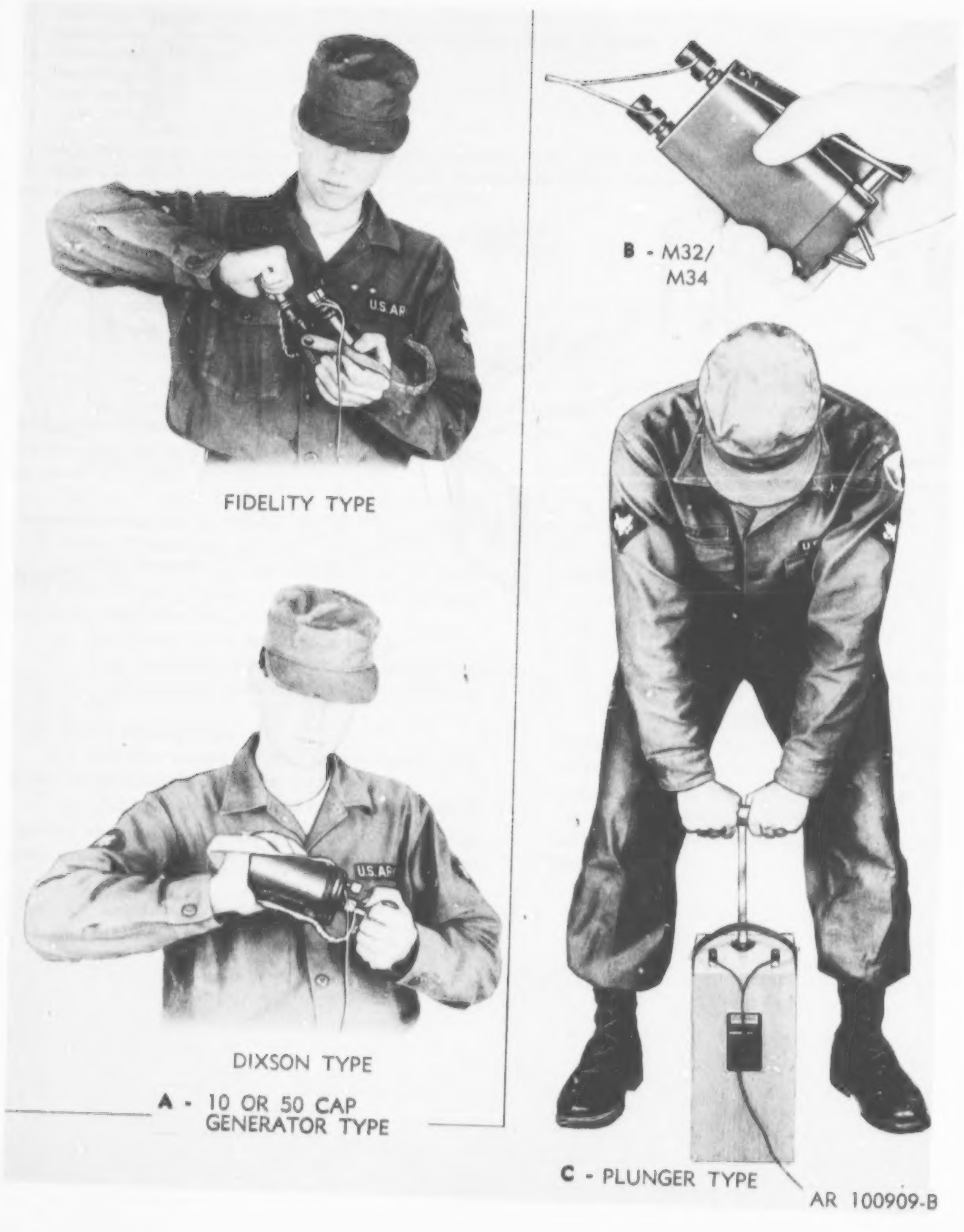

Figure 2-7. Actuating blasting machines.

WARNING 2

Face away from caps when circuit is completed to minimize face injuries from accidental initiation. If at all possible, maintain cover between blasting caps and testing personnel.

(2) Check circuit for RF by contacting remaining free end of cap lead wire to remaining free end of firing wire conductor.

(3) Splice free end of cap lead wire to free end of firing wire (para 2-5).

h. Inserting Caps into Charges. Place blasting caps into explosive charges and fasten caps securely to charges (fig. 2-6).

i. Testing Entire Circuit.

(1) Move to firing position and test entire firing circuit with blasting cap test set or galvanometer as described in paragraph 2-7*c* through *e*.

(2) Twist free ends of firing wire together.

j. Exercising Blasting Machine. Before connecting to firing wires, operate handle of blasting machine several times to assure that machine is properly freed (see para 2-4*l*).

k. Connecting Blasting Machine. Untwist ends of firing wire and fasten them to the two posts of blasting machine.

l. Operation of Blasting Machine.

(1) *Fidelity-type 10-cap machine:*

(*a*) Loop machine strap over back of left hand and grasp bottom of machine body in left hand.

(*b*) Fit handle onto machine shaft in a favorable attitude for twisting (A, fig. 2-7).

(*c*) Twist handle with maximum effort, trying to get as much initial snap into the motion as possible.

(2) *Dixson-type 10-cap machine.*

NOTE

Before using Dixson machine, each operator must practice actuating machine until he is assured that he has mastered it. It is recommended that new operators practice using the machine by hooking up a 10-cap series circuit on a 500-foot length of firing cable and attempting to fire caps. If caps fail to function, operator has not developed full machine output and should repeat procedure until he has mastered machine.

(*a*) Hold bottom of machine in right hand with leather strap looped around hand to secure machine (A, fig. 2-7).

(*b*) Insert handle.

(*c*) Hold machine in a nearly horizontal position in front of body, a little above waist. Impart maximum snap possible to machine body with right hand while rotating handle as hard as possible with left hand in opposite direction. Left elbow should be close to body at beginning of snap. Keep left wrist locked straight while rotating handle.

NOTE

This left-handed technique may seem awkward; however, it enables operator to impart greater initial-snap to machine by twisting both hands and moving the larger and heavier part of the machine with his stronger hand.

(3) *Blasting machines M32 and M34.*

(*a*) Release blasting machine handle by rotating D-ring until handle springs outward from body of machine.

(*b*) Hold machine in upright position (terminals up) in either hand, so that plunger end of handle rests under base of thumb and fingers grasp machine body (B, fig. 2-7).

(*c*) Squeeze hand sharply several times in succession until charge fires. No more than four strokes should be required.

(4) *30-Cap, 50-cap and 100 cap machines.*

NOTE

Before using a newer type 50-cap machine (NSN 1375-00-141-9495), it is recommended that new operators practice with a blasting cap circuit until they have mastered the operation.

(*a*) Set machine squarely on a solid, level place and lift plunger by handle, to its maximum extension (C, fig. 2-7).

(*b*) With body well balanced, feet wide apart, and in a partially stooped position, grasp handle firmly with both hands and push plunger down with a quick, hard stroke. Maximum electrical output will be obtained by trying to knock the bottom out of the machine with the stroke.

NOTE

The machine is built to withstand all the force that an operator can generate in pushing plunger down.

2-5. Splicing Electric Wires

a. Stripping Wire.

(1) Strip about three inches of insulating material from end of wire.

(2) Expose about three inches of bare wire (fig. 2-8).

(3) Remove any foreign matter such as enamel by carefully scraping wire with back of a knife blade or other suitable tool. Wires should not be nicked, cut, or weakened when wires are bared, and multiple-strand wires should be twisted lightly after scraping.

b. Splicing Method. Two wires, which have been prepared as described in *a* above, may be spliced as shown in figure 2-8. This is called the Western Union *pigtail* splice.

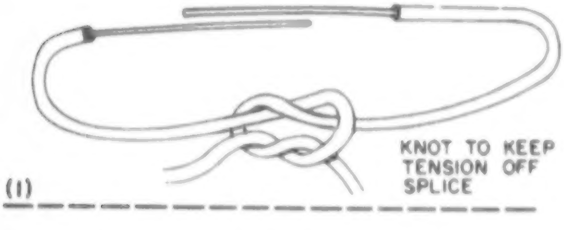

Figure 2-8. Western Union pigtail splice.

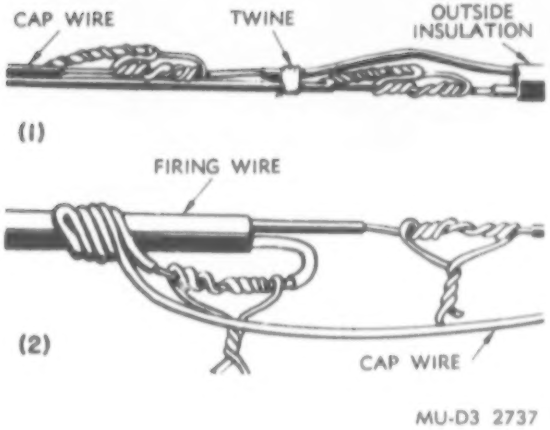

Figure 2-9. Splicing two pairs of wires.

c. Precautions for Splicing. A short circuit may occur very easily at a splice if the following precautions are not observed.

(1) If pairs of wires are spliced, stagger the two separate splices and tie with twine or tape ((1), fig. 2-9).

(2) An alternate method of preventing a short circuit at the point of splice is shown in (2), figure 2-9. Splices are separated, not staggered, in the alternate method.

(3) Whenever possible, insulate splices from ground or other conductors by wrapping them with friction tape or other electric insulating tape. This is particularly necessary when splices are placed in contact with wet ground.

(4) Circuit splices, not taped or insulated, should not lie on moist ground. Splices should be supported on rocks, blocks, or sticks so that only insulated portions of wires touch ground. They may also be protected by inserting them into cardboard cap spools, which may be bent to hold splice firmly inside.

(5) To protect splices from damage by pulling, tie ends in an overhand or square knot, allowing sufficient length for each splice ((1), fig. 2-8).

2-6. Series Circuits

a. Common Series. This is used for connecting two or more charges fired electrically by a single blasting machine (A, fig. 2-10). A common series circuit is prepared by connecting one blasting cap lead wire from first charge position to one lead wire in second charge position and so on until only two end wires are free, then connecting free ends of cap lead wires to ends of firing wires.

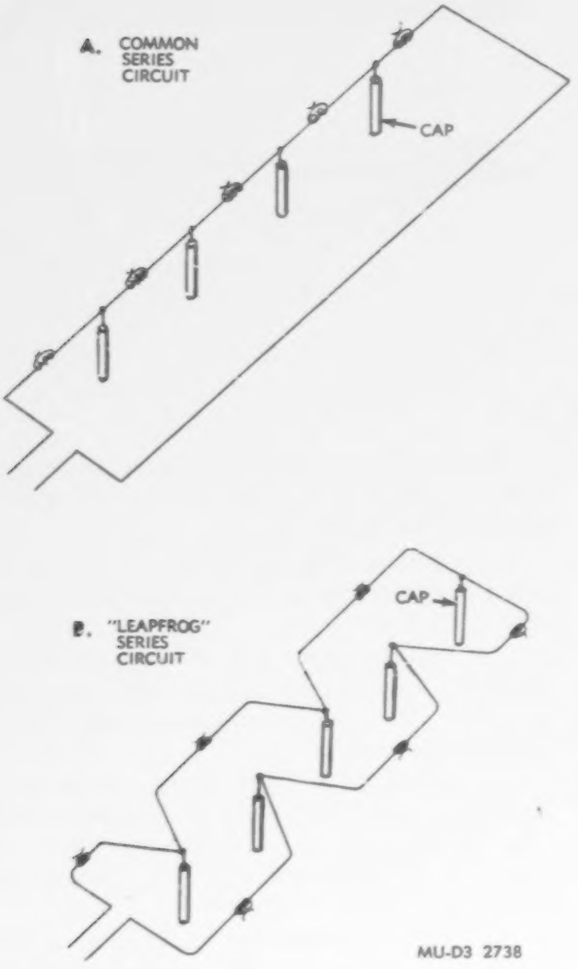

Figure 2-10. Series circuits.

Connecting wires (usually annunciator wire) are used when distance between blasting caps is greater than length of usual cap lead wires.

b. Leapfrog Series. The *leapfrog* method of connecting charges in series (B, fig. 2-10) is useful for firing ditching charges or any long line of charges. It consists of omitting alternate charges on the way and then connecting them to form a return path for the electric impulse to reach the other lead of firing wire. This brings both end wires out at the same end of the line of charges, and thus eliminates laying a long return lead from the far end of the line of charges back to the firing wire.

2-7. Testing Electric Wires, Blasting Caps and Circuits

a. Testing Firing Wire. Test firing wire while on reel for serviceability. After wire is unreeled, test it again for any damage caused during unreeling and laying of wire.

(1) When using blasting cap test set M51:

(*a*) Check test set by connecting posts with a piece of bare wire (fig. 2-11). Indicator lamp should flash when handle is squeezed.

(*b*) Separate firing wire conductors at both ends.

(*c*) Connect pair of firing wire conductors at one end to test set binding posts.

(*d*) Actuate test set. Indicator lamp should not flash. If it does, firing wire has a short circuit and is unserviceable (fig. 2-12).

(*e*) Twist wires together at one end, and connect those at other end to test set posts. Actuate test set. Indicator lamp should flash. If it does not flash, firing wire has a break and is unserviceable.

(2) When using galvanometer:

(*a*) Check galvanometer by holding a piece of metal across its terminals (fig. 2-11). If battery is good, and battery connections are clean, this should show a wide deflection of needle, approximately 25 units. Galvanometer can be used to closely check circuits and components only if battery is good and its connections are clean. However, it can check for continuity even if needle does not give a full deflection on shorting of terminals.

(*b*) Separate firing wire conductors at both ends, and touch those at one end to galvanometer posts. Needle should not move. If it does, firing wire has a short circuit (fig. 2-12).

(*c*) Twist wires together at one end and touch those at other end to galvanometer posts. This should cause a wide deflection of needle. No movement of needle indicates a break; a slight movement indicates a point of high resistance which may be caused by a dirty wire, loose wire connections, or wires with several strands broken off at connections. Make sure conductors at blasting machine site stay twisted together.

b. Testing Blasting Cap.

WARNING

Before removing shunt and before testing electrical blasting cap for continuity, place cap in a hole, behind a barricade, or under a sandbag. Unroll so that cap is

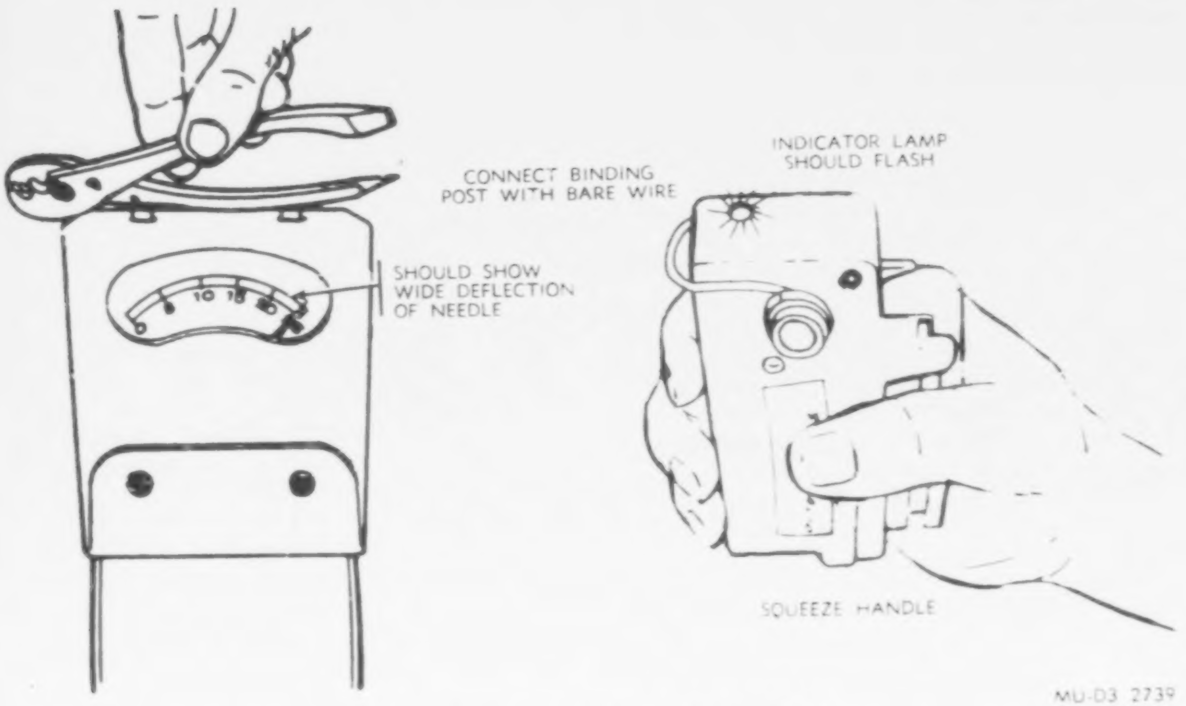
CONNECT BINDING POST WITH BARE WIRE
SHOULD SHOW WIDE DEFLECTION OF NEEDLE
10
15
20
25
INDICATOR LAMP SHOULD FLASH
SQUEEZE HANDLE
MU-D3 2739

Figure 2-11. Testing galvanometer or test set.

as far as possible from operator and pointing away from him (i.e., blasting cap leg wires are toward operator). Make sure cap is pointed away from other personnel and caps.

WARNING

When uncoiling cap lead wires, the cap will not be held directly in the hand, but will be held by the wires approximately one inch from the cap. Lead wires should be straightened out as far as necessary by hand and shall not be thrown, waved through the air, or snapped as a whip to loosen wire coils.

(1) *When using blasting cap tests set M51:*

(*a*) Check test set as described in *a* (1) (*a*) above.

(*b*) Remove short circuit shunt (fig. 2-6) from lead wires of electric blasting cap.

(*c*) Attach lead wires to posts.

(*d*) Squeeze test set handle. If indicator lamp flashes, blasting cap is satisfactory. If it does not flash, cap is defective and should not be used.

(2) *When using blasting galvanometer:*

(*a*) Check galvanometer as described in *a*(2)(*a*) above.

(*b*) Remove short circuit shunt (fig. 2-6) from lead wires of electric blasting cap.

(*c*) Touch one cap lead wire to one galvanometer post and other cap lead wire to other post. If galvanometer's needle deflects slightly less than it did when instrument was tested ((*a*) above), blasting cap is satisfactory; if not, cap is defective and should not be used.

NOTE

If battery is in good condition, galvanometer should read 25 units when instrument is tested and about 24 units when a good blasting cap is tested.

c. Testing Series Circuits.

(1) Connect caps as shown in figure 2-10 (either method).

(2) When using blasting cap test set M51, connect free ends of blasting cap lead wires to test set binding posts. Indicator lamp should flash when test set is functioned.

(3) When using galvanometer, touch blasting cap lead wires to galvanometer posts. This should cause a wide deflection of needle. If no wide deflection occurs, circuit is defective.

d. Testing Entire Circuit.

(1) Splice firing wires to series circuit and move to firing position.

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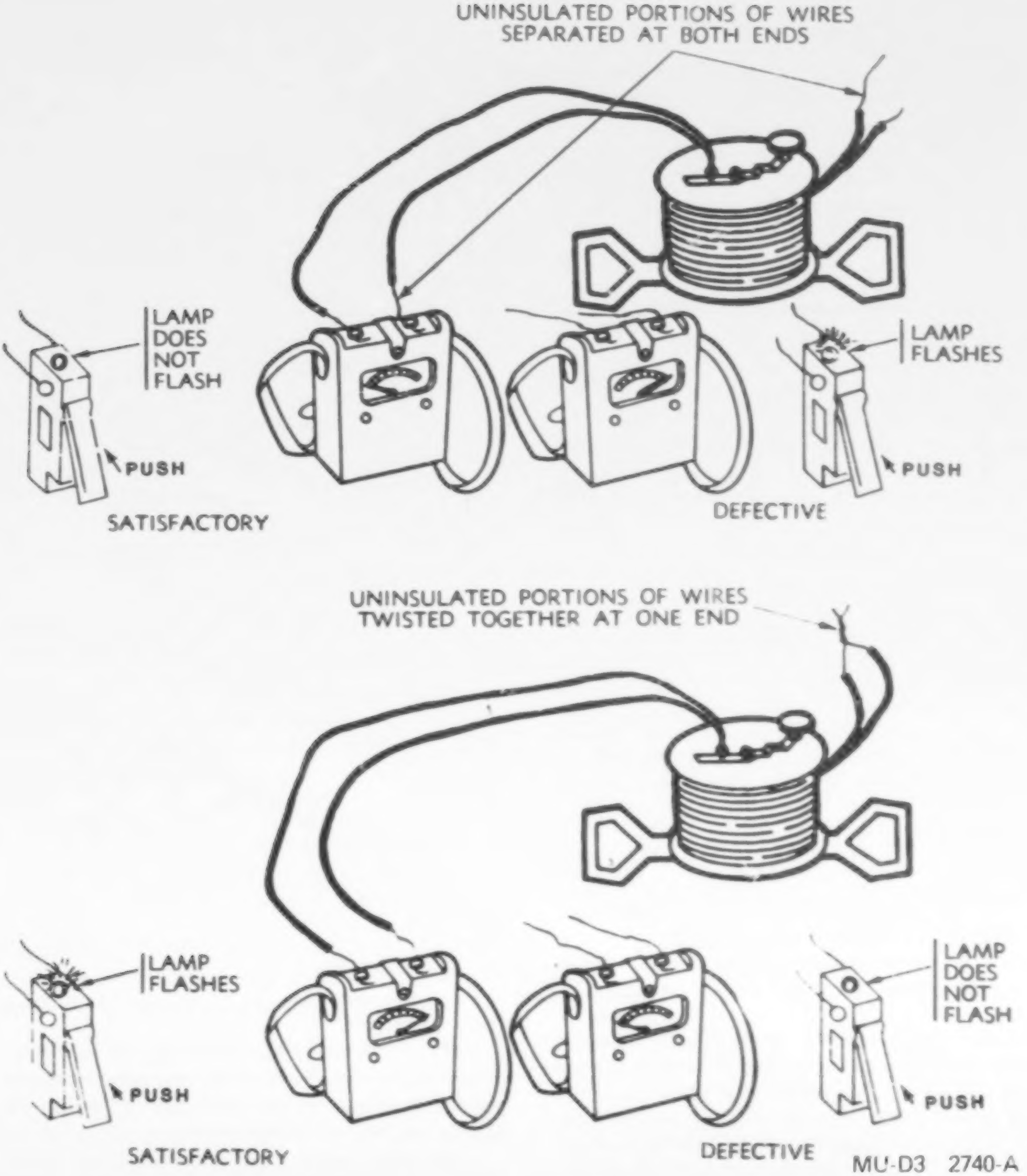


Figure 2-12. Testing firing wire.

(2) When using blasting cap test set M51, connect free ends of firing wire to binding posts. Indicator lamp should flash. If lamp does not flash, circuit is defective.

NOTE

Test set M51 will read the same (lamp will flash) when testing either a properly set-up circuit or a circuit with a short in it. Further checking is required to differentiate between a proper circuit or one with a short in it.

(3) When using galvanometer, touch free ends of firing wire to galvanometer posts. This should cause a wide deflection of needle. Magnitude of deflection depends upon number of caps and length of firing wire. The circuit is defective if galvanometer indicates considerably more or less resistance than it should for the circuit, or if galvanometer does not respond to the testing circuit.

e. Checking Defective Circuits. If firing circuit is defective, proceed as follows:

(1) Shunt firing wires.

(2) Go down range and recheck circuit, repeating *a* and *b* above.

(3) If a splice is found defective, resplice wires.

(4) If a cap is found defective, replace it.

(5) Test all caps and wires in circuit.

(6) Test entire circuit again to make sure that all problems have been located before attempting to fire charge.

2-8. Electric Misfires

WARNING

> To minimize the occurrance of misfires, make one individual responsible for all electrical wiring in a demolition circuit.

a. Cause of Electric Misfires. Common specific causes of electric misfires include:

(1) Inoperative or weak blasting machine.

(2) Improperly operated blasting machine.

(3) Defective and damaged connections, causing either a short circuit, a break in the circuit, or high resistance with resulting low current.

(4) Faulty blasting cap.

(5) The use in the same circuit of blasting caps made by different manufacturers (other than M6).

(6) The use of more blasting caps than blasting machine rating permits.

b. Procedures for Electric Misfires.

(1) If blasting caps fail to fire:

(a) Check connections to machine.

(b) Try functioning machine again with maximum effort.

(c) Change operators.

(d) For dual firing systems, use secondary firing system.

(e) After three unsuccessful tries, check circuit using galvanometer or test set M51.

(f) Try second machine (if available).

WARNING

> Wait ½ hour before approaching any misfire unless it can be positively ascertained that failure is strictly electrical. If misfire is strictly electrical in nature, corrective action may be taken immediately.

(g) If blasting caps still fail to function, short the firing wire conductors and check circuit and all components.

(2) Refer to nonelectric misfire procedures (para 2-3) for handling underground charges.

2-9. Detonation by Induced Currents and Lightning

a. Induced Currents.

WARNING

> If electric blasting caps are to be transported near mobile transmitter (e.g., in helicopter) or fixed transmitters, the caps will be placed in a metal container. Cover of container must be snug fitting and overlap container body by a minimum of ½-inch. Caps will not be removed from container while close to an operating transmitter until the hazard has been fully evaluated and determined to be acceptable.

Premature detonation of electric blasting caps by induced current from radio frequency (RF) signals is possible. Table 2-2 showing the minimum safe distance in respect to transmitter power, indicates distance beyond which it is safe to conduct electrical blasting even under the most adverse conditions. If blasting distances are less than those shown in tables 2-2, 2-3 and 2-4, you lack the information required to use them, *the only safe procedure is to use a nonelectric system.* If, however, use of an electric blasting cap is necessary to retain precise command firing, use detonating cord priming of charge. Run detonating cord from charge to firing point and attach a shunted electric cap to the detonating cord when ready to fire. Run cap lead wires to a protected position, remove shunt, and fire charge electrically.

Table 2-2. Minimum Safe Distance Between RF Transmitters and Electric Transmitters and Electric Blasting Operations

Transmitter Power (Watts)	Minimum Safe Distances (Feet)[3]	
	Commercial AM Broadcast Transmitters	HF Transmitters Other Than AM Broadcast
100	750	750
500	750	1700
1,000	750	2400
4,000	750	4800
5,000	850	5500
10,000	1300	7600
25,000	2000	12000
50,000	2800	17000
100,000	3900	24000
500,000	8800	55000

[1] Present maximum power of U.S. boardcast transmitters in Commercial AM Broadcast Frequency Range (0.535 to 1.605 MHz).

[2] Present maximum for International Broadcast.

[3] To convert feet to meters on this chart—feet X0.3—meters.

Table 2-3. Minimum Safe Distance Between Mobile RF Transmitters and Electric Blasting Operations

Transmitter Power (Watts)	MF 1.6 to 3.4 MHz Industrial	HF 28 to 29.7 MHz Amateur	VHF 35 to 36 MHz Pub. Use 42 to 44 MHz Pub. Use 50 to 64 MHz Amateur	VHF 144 to 148 MHz Amateur 150.8 to 161.6 MHz Public Use	UHF 450 to 460 MHz Public Use
5[1]					
10	40	100	40	15	10
50	90	220	90	35	20
100	125	310	130	50	30
180[2]				65	40
250	200	490	205	75	45
500[3]			290		
600[4]	300	760	315	115	70
1,000[5]	400	980	410	150	90
10,000[6]	1250		1300		

[1] Citizens band radio (Walkie-Talkie) (26.96 to 27.23 MHz)—Minimum safe distance—five feet).

[2] Maximum power for 2-way mobile units in VHF (150.8 to 161.6 MHz range) and for 2-way mobile and fixed station units in UHF (450 to 460 MHz range).

[3] Maximum power for major VHF 2-way mobile and fixed station units in 35 to 44 MHz range.

[4] Maximum power for 2-way fixed station units in VHF (150.8 to 161.6 MHz range).

[5] Maximum power for amateur radio mobile units.

[6] Maximum power for some base stations in 42 to 44 MHz band and 1.6 to 1.8 MHz band.

[7] **Note:** To convert feet to meters on this chart—feet X0.3 = meters.

Table 2-4. Minimum Safe Distance Between TV and FM Broadcasting Transmitters and Electric Blasting Operations

Effective radiative power (watts)	Minimum safe distances (feet)		
	Channels 2 to 6 and FM	Channels 7 to 13	UHF
up to 1,000	1,000	750	600
10,000	1,800	1,300	600
100,000	3,200	2,300	1,100
316,000[2]	4,300	3,000	1,450
1,000,000	5,800	4,000	2,000
5,000,000[3]	9,000	6,200	3,000
10,000,000	10,200	7,400	3,500
100,000,000			6,000

[1] Present maximum power. Channels 2 to 6 and FM.

[2] Present maximum power. Channels 7 to 13.

[3] Present maximum power. Channels 14 to 83.

[4] To convert feet to meters on this chart—feet X0.3 = meters.

b. Lightning. Lightning is a hazard to both electric and nonelectric blasting caps. A strike or a nearby miss is almost certain to initiate either type of cap and other sensitive explosive elements such as caps in delay detonators. Lightning strikes, even at remote locations, may cause extremely high local earth currents which may initiate electrical firing circuits. Effects of remote lightning strikes are multiplied by proximity to conducting elements, such as those found in buildings, fences, railroads, bridges, streams, and underground cables or conduit. The only safe procedure is to suspend all blasting activities during electrical storms and when one is impending.

c. Electric Power Lines. Electric firing will not be performed in training within 155 meters of energized power transmission lines. When it is necessary to conduct blasting operations at distances closer than 155 meters to electric power lines, nonelectric firing systems should be used or power lines deenergized (AR 385-63).

2-10. Detonating Cord Firing Systems-Methods of Use

Of all the firing systems for explosives, a detonating cord firing system is probably the most versatile and in many cases the most easily installed. The detonating cord firing system is especially applicable for underwater and underground blasting because the blasting cap of the initiating system may remain above water or ground.

a. A detonating cord system utilizes detonating cord as a relay element between the initiator and the main explosive charge. A detonating cord firing system has the following advantages:

(1) It allows a long distance between the sensitive initiator element (blasting cap or delay detonator) and the main charge.

(2) It allows simultaneous detonation of a number of charges with a single initiator.

(3) The detonating cord itself is moisture resistant and thus can be used to run the priming system into damp areas or even underwater.

(4) Since most charges can be primed with detonating cord, its lack of sensitivity to accidental initiation reduces the danger of misfires underground (i.e. digging into a misfired detonating cord primed charge is less dangerous than digging into a blasting cap primed charge).

b. The set-up of a detonating cord firing system is optional. The charge may be primed with encircling loops of detonating cord or knots of it within plastic explosive or by means of a nonelectric blasting cap crimped onto the end of the detonating cord. Details are given in the priming section (pars. 2-2 and 2-17). The length of the detonating cord lead-in can be as short or long as desired—even hundreds of feet. The detonating cord may be initiated by an electric or non-electric blasting cap, or a delay detonator. The method of initiating the detonating cord may be an electric or non-electric blasting cap or a delay detonator. A firing device or time fuze may be used to initiate a non-electric cap. A standard blasting machine will be used to initiate electric caps.

c. Connection of the initiating cap (or detonator) must assure a good contact to the detonating cord. The cap must be securely attached to the detonating cord at a point at least six inches from the free end using several wraps of tape, string or cloth or an M1 Detonating Cord Clip (figs. 2-13 and 2-17). Hookup of an electric cap is done in the normal electric priming sequence considering the detonating cord as the charge (since it is coupled directly to the charge).

2-11. Detonating Cord Connections

The preferred method of connecting the detonating cord is as follows:

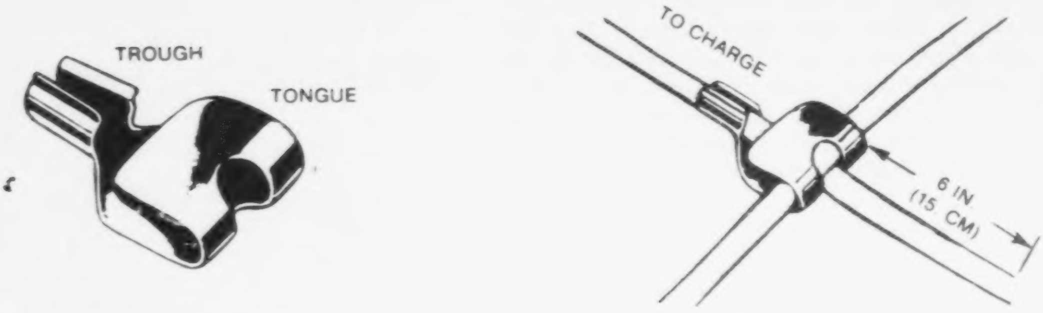
a. Cut off at least 6 inches from each free end to be connected. Tape cut off pieces to the charge to avoid separate disposal.

b. Overlap the newly cut free ends by 18 inches.

c. Secure the cords together with detonating cord clips, 6 inches from each end of the free ends and 6 inches from each other (fig. 2-13).

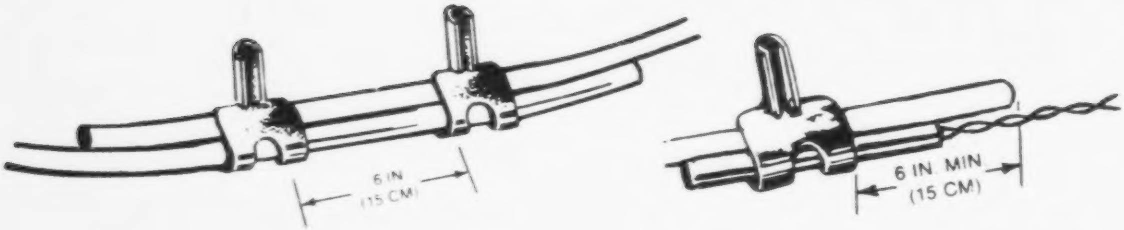
NOTE

The 6-inch overlap of each free end is to keep any moisture absorbed after the splice is made from affecting the overlap area between the two clips.



CLIP BEFORE BENDING

BRANCH LINE CONNECTION



SPLICING TWO CORDS

CONNECTING BLASTING CAP TO CORD

AR 100105-C

Figure 2-13. Connections using M1 detonating cord clip.

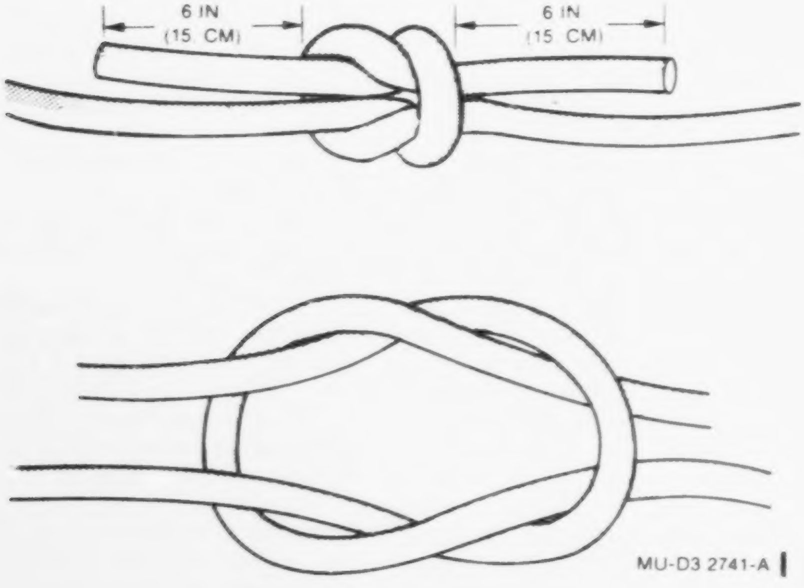


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Figure 2-14. Square knot connections.

If M1 detonating cord clips are in short supply or not available, a square knot (fig. 2-14) or one M1 detonating cord clip in lieu of the square knot may be used provided at least 6-inch lengths extend from the point of connection. When fabric-covered detonating cord is used, fabric must not be removed. Knot may be placed in water or in ground but cord must be detonated from a dry end.

a. Branch Line Connections. A branch line is fastened to a main line by means of a detonating cord clip (fig. 2-13) or a girth hitch with one extra turn (fig. 2-15). The angle formed by branch line and charge end of main line should be approximately 90 degrees. At a smaller angle, branch line may be blown off main line without being detonated. At least 6 inches of the running end of branch line is left free beyond the tie.

NOTE

> The detonating cord does not always generate a detonation wave in a backward direction (i.e., through an angle over 90 degrees).

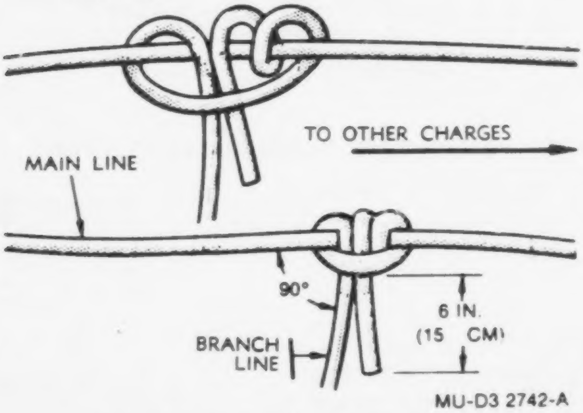

Figure 2-15. Girth hitch with one extra turn.

b. Ring Main. A ring main is made by bringing the main line back in the form of a loop and attaching it to itself with a girth hitch with one extra turn (fig. 2-16) or M1 detonating cord clip. This will detonate an almost unlimited number of charges. The ring main makes detonation of all charges more positive because the detonating wave approaches branch lines from both directions and charges will be detonated even when there is one break in the ring main. Branch line connections should be made perpendicular to the ring main. Kinks in lines should be avoided, and changes in directions should not be sharp. Any number of branch lines may be connected to ring main, but a branch line is never connected at a point where ring main is spliced. In making detonating cord branch line connections, avoid crossing lines. However, if this is necessary, be sure to have at least 1 foot of clearance at all points between detonating cords; otherwise cords will cut each other and destroy firing system.

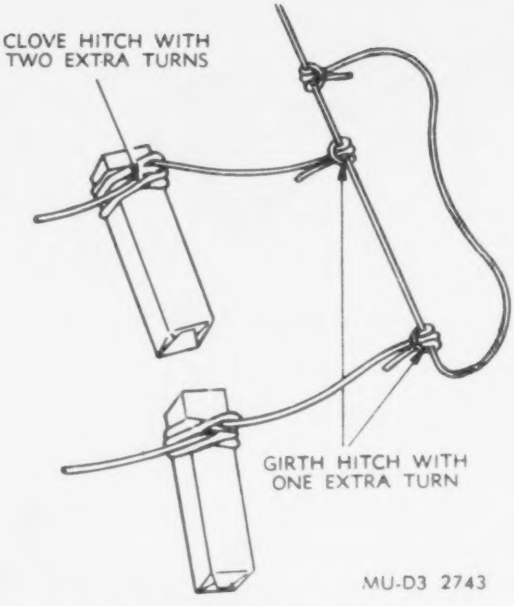

Figure 2-16. Ring main with branch lines

2-12. Detonating Cord Misfires

a. Failure of Nonelectric Blasting Cap.

(1) If nonelectric blasting cap attached to detonating cord fails to function, delay investigation for at least 30 minutes.

(2) Fasten new blasting cap on detonating cord.

b. Failure of Electric Blasting Cap.

(1) If exposed electric blasting cap fastened to detonating cord fails to fire, check connections to machine.

(2) Try functioning machine again with maximum possible effort.

(3) If three or four tries do not produce results, disconnect leads and test blasting circuit for any breaks or short circuit.

(4) Short firing wire leads before leaving firing position to correct problem. If necessary, replace original blasting cap.

c. Failure of Detonating Cord.

(1) If detonating cord fails to function at explosion of an exposed electric or nonelectric blasting cap, investigate immediately.

(2) Attach new blasting cap to detonating cord, taking care to fasten it properly.

d. Failure of Branch Line. If detonating cord main line detonates but a branch line fails, fasten blasting cap to branch line and fire it separately.

e. Failure of Charge to Explode.

(1) If charge is above ground, and detonating

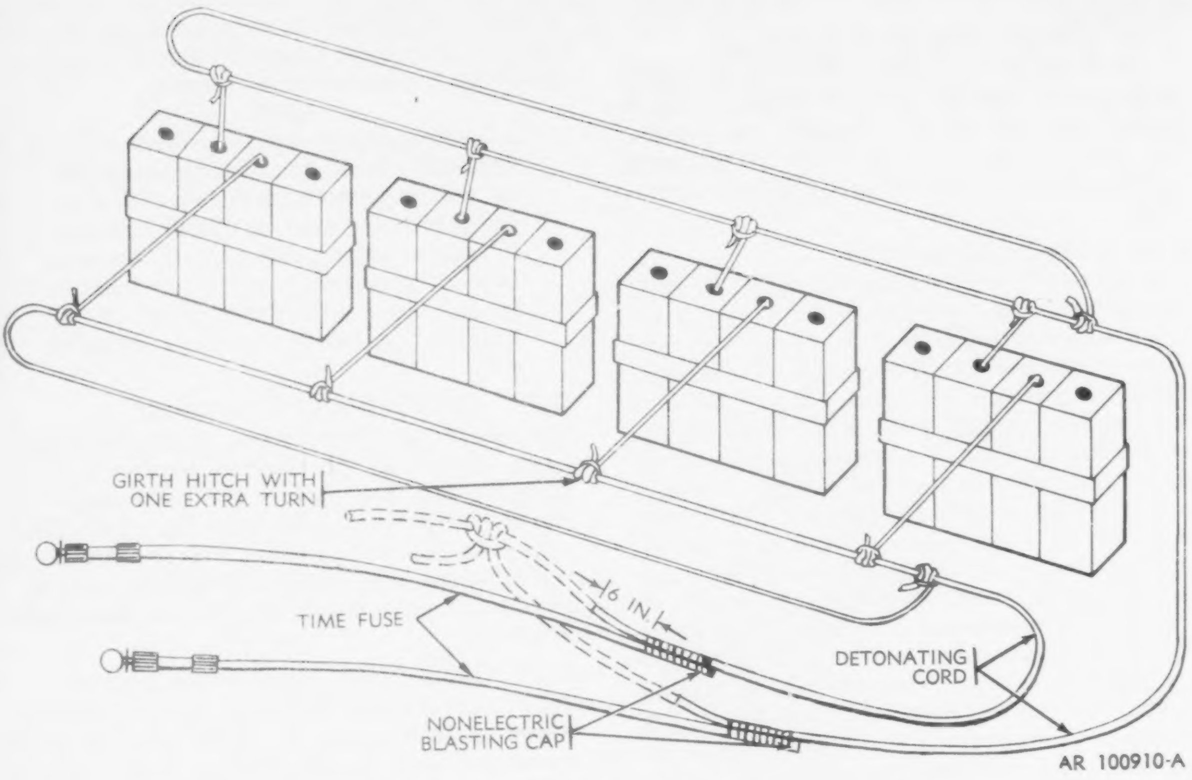

Figure 2-17. Nonelectric dual firing system with dual detonating cord priming.

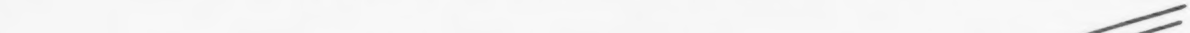

Figure 2-18. Electrical dual firing system.

cord leading to charge detonates but charge fails to explode, delay investigation until it is certain that charge is not burning.

(2) If charge is intact, insert new priming.

(3) If charge is scattered by detonation of original detonating cord, reassemble as much of original charge as possible, place new charge if necessary, and reprime. Make every attempt possible to recover all explosives scattered by misfire, particularly those used in training exercises.

2-13. Dual Firing Systems

There is always a certain amount of danger to personnel investigating misfires. Since duel priming increases greatly the probability of successful firing, it should be used whenever possible. Duel priming consists of two complete systems independent of each other, and each capable of firing the same charge(s). It can be two electric systems, two nonelectric systems, or an electric and nonelectric system. The main reason for duel priming is reliability (i.e., prevention of misfires). Rigging a dual priming system for just a few separated charges is usually not worth the effort. Simple circuits are inherently more reliable than complex ones so dual priming is much more advantageous (even necessary) in complex demolition circuits. Circumstances will of course affect the user's decision on whether or not to make the extra effort. In a critical situation it may well be worth the extra effort to dual prime even a single charge in order to gain the extra small measure of reliability. Refer to paragraph 2-31.

2-14. Nonelectric Dual Firing System

This consists of two independent nonelectric systems for firing a single charge or set of charges. If two or more charges are to be fired simultaneously, two detonating cord ring mains are laid out, and a branch line from each charge is tied into each ring main. Figure 2-17 shows the layout for a nonelectric dual firing system.

NOTE

A small measure of additional reliability can be obtained from dual-detonating cord-primed firing systems by extending the cap ends of the lead-in detonating cords and tying them together in a square knot or a girth hitch with one extra turn. For a nonelectric firing set-up the time fuse for each cap is sequentially initiated. Assure sufficient time fuse is allowed for personnel safety.

2-15. Electric Dual Firing System

This dual firing system consists of two independent electric circuits, each with an electric blasting cap in each charge, so that firing of either circuit will detonate all charges. Correct layout is shown in figure 2-18. Firing wires of the two circuits should be kept separated so that both will not be cut by a single bullet or a single shell fragment. Firing points also should be at two separate locations.

2-16. Combination Dual Firing System

The combination dual firing system uses an electric and nonelectric firing system (fig. 2-19). Each charge is primed electrically and nonelectrically. Both the electric and nonelectric systems must be entirely independent of each other. The nonelectric system must be fired first.

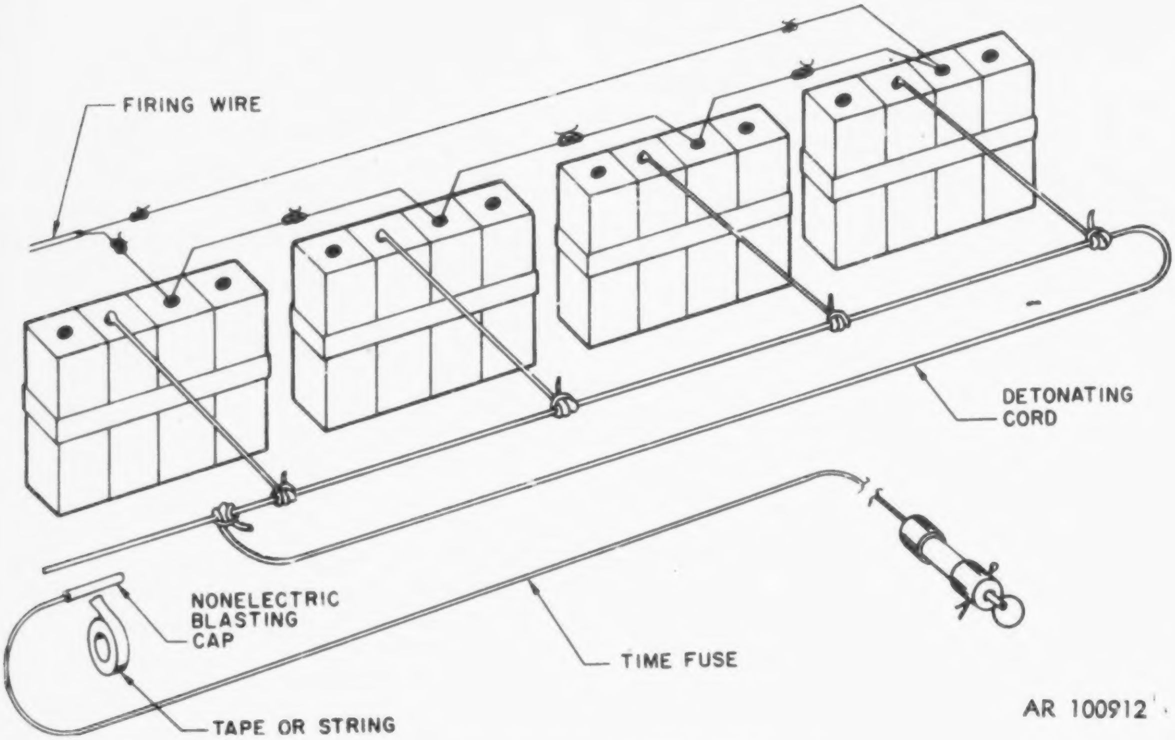

Figure 2-19. Combination dual firing system.

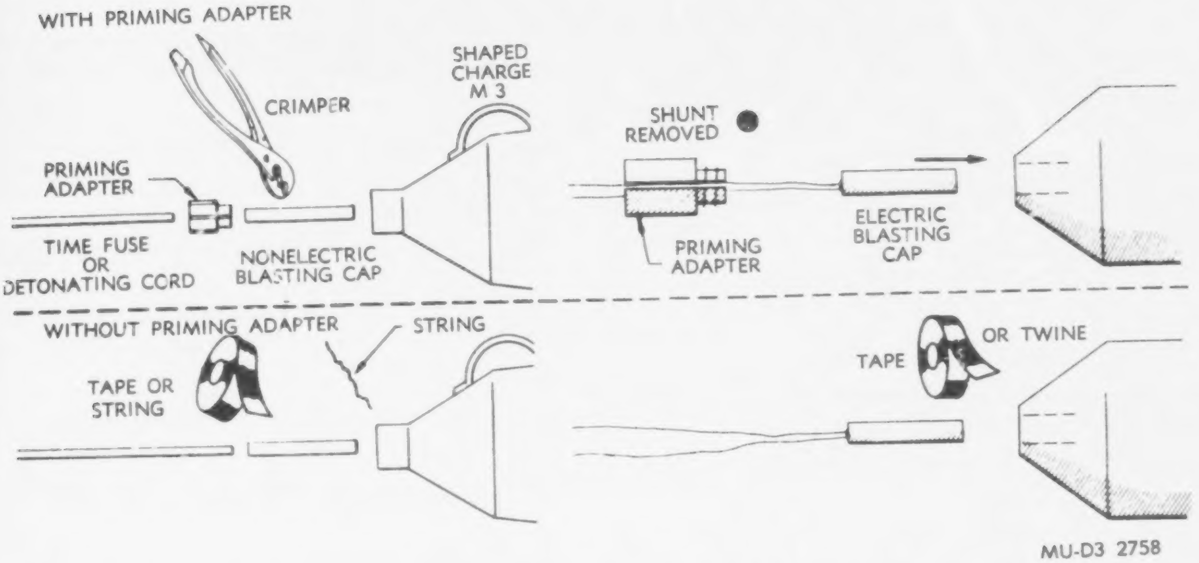

Figure 2-20. Nonelectric and electric priming of shaped charges.

2-17. Priming Charges with Threaded Cap Wells (Block, Shaped, Bangalore Torpedo, Universal Destructor: M10 and Explosive Destructor: M19)

a. Nonelectric Priming.

(1) *With priming adapter.* Priming adapters should be used, if available, to secure nonelectric blasting cap and time blasting fuse to charges with threaded cap wells (paras 1-12*c* and 2-2; figs. 2-4, 2-20, and 2-21).

(2) *Without priming adapter.* If priming adapters are not available but charges have threaded cap wells, they are primed as follows (figs. 2-20 and 2-21 and method 1, fig. 2-22):

(*a*) Wrap string tightly around charge and tie it securely leaving about 6 inches of loose string on each end after making tie.

(*b*) Insert blasting cap with fuse attached into cap well.

(*c*) Tie loose string around fuse with two half hitches to prevent blasting cap from being separated from charge. Do not tie string so tight that powder train is broken in fuse.

b. Electric Priming.

(1) Priming adapters should be used, if available, to secure electric blasting caps to charges with threaded cap wells. Procced as follows:

(*a*) Untwist free ends of lead wire and fasten them to firing wire (para 2-4).

(*b*) Pass lead wires through slot of adapter and slide adapter into place over cap (fig. 2-6.

(*c*) Insert cap into well of explosive and screw adapter into place.

(2) *Without priming adapter.* If a priming adapter is not available, proceed as follows:

(*a*) Untwist free ends of lead wire and fasten them to firing wire.

(*b*) Insert electric cap into cap well and tie lead wires around charge by two half hitches or a girth hitch (fig. 2-23). Allow some slack in wires between blasting cap and tie to prevent any pull on blasting cap.

c. Detonating Cord Priming.

(1) Block demolition charges may be primed with detonating cord in several ways.

NOTE

A 6-inch length of detonating cord equals the power output of an electric or nonelectric blasting cap. A 6-inch length of detonating cord will not detonate explosives as reliably, however, since the power output is not as concentrated as a blasting cap.

(*a*) *Assured-detonation method.* This

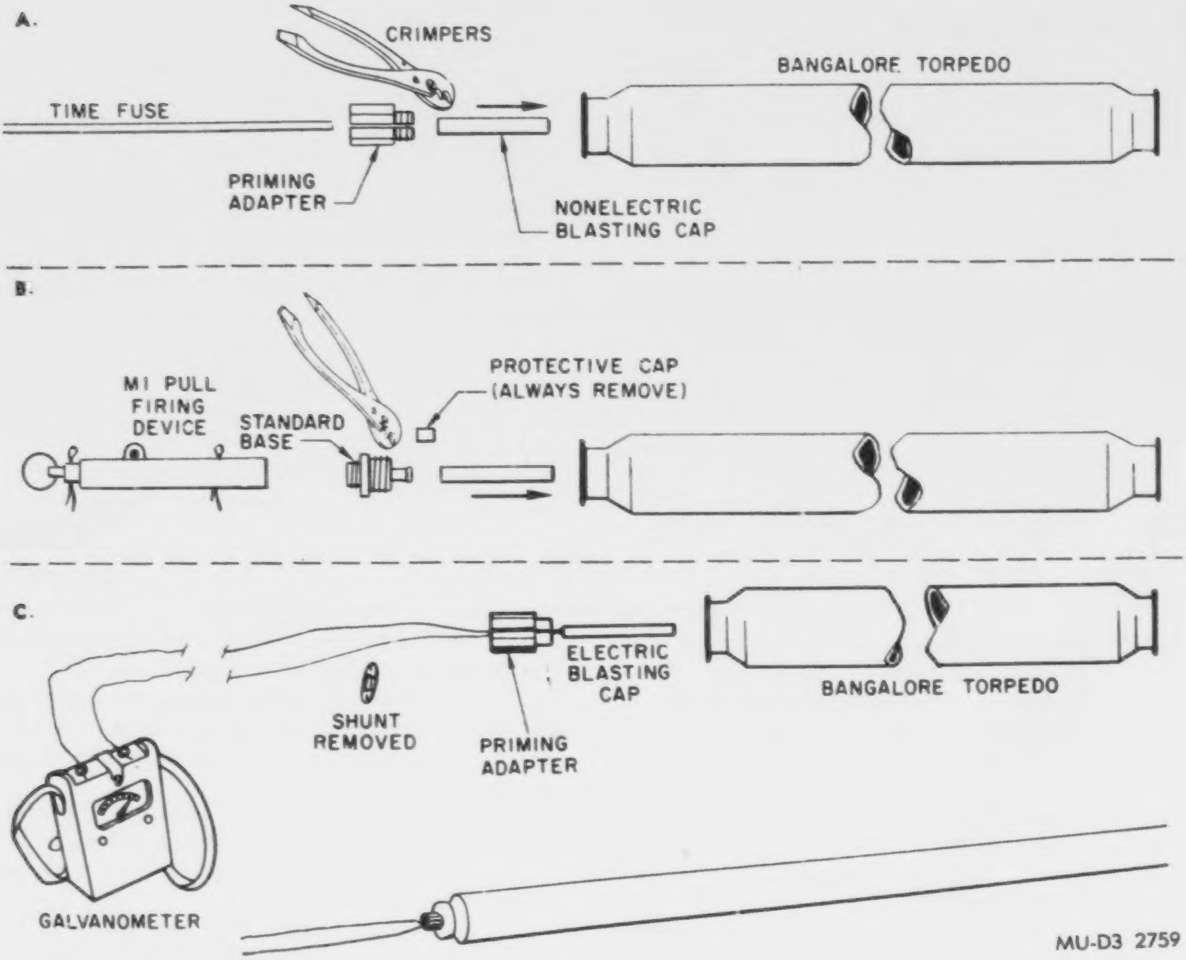

Figure 2–21. Nonelectric and electric priming of bangalore torpedo.

method offers the greatest assurance of detonation. Affix a nonelectric blasting cap to end of detonating cord and place it in demolition block similar to nonelectric priming methods (para 2 17*a*). The system is then initiated by a nonelectric or electric assembly.

(*b*) *Common method* (A, fig. 2–24). Lay one end of a 4-foot length of detonating cord at an angle across charge (on top of booster if present). Wrap running end three times around block, and lay end at angle. On fourth wrap, slip running end under all wraps parallel to other end and draw tight. Initiate by electric or nonelectric system.

(*c*) *Alternate method No. 1* (B, fig. 2–24). Tie a 4-foot length of detonating cord around explosive block (on top of booster, if present) with a clove hitch with two extra turns. Cord must fit snugly against blocks, and loops must be pushed close together. Use an electric or nonelectric firing system to initiate charge.

NOTE

Alternate method No. 2 is more applicable to short, rather than long, detonating cord branch lines or primers.

(d) Alternate method No. 2 (C, fig. 2-24). Place a loop of detonating cord on charge, wrap cord around charge and loop four times. Pull running end through eye of loop and tighten. This method is also initiated by an electric or nonelectric system.

(e) Alternate method No. 3 (fig. 2-25). Using 20- to 24-inch length of detonating cord, form a Uli knot using a minimum of 6 wraps. This knot is equivalent to the power output of 3 to 4 blasting caps. Tape knot tightly to demolition charge to be detonated. When using demolition charge M2 (tetrytol), center Uli knot over tetryl booster, 2 1/2 inches from end of block and tape in place. Use electric or nonelectric system to detonate charge.

(2) *Detonating cord priming of shaped charges, bangalore torpedo, universal destructor M10, and explosive destructor M19.* These charges are primed with detonating cord by attaching a nonelectric blasting cap to end of detonating cord and following procedure in paragraph 2-17*a* above.

2-18. Priming Charges with Nonthreaded Cap Well—40-Pound Ammonium Nitrate Cratering Charge.

WARNING

For safety in priming, use detonating cord whenever charges are placed under ground.

NOTE

Since ammonium nitrate is hygroscopic and becomes ineffective if it has absorbed moisture, do not use a charge on which the metal case has been penetrated by rust or other damage.

a. Nonelectric Priming (fig. 2-26).

(1) Place a fused nonelectric blasting cap in cap well on side of charge container.

(2) Tie a string around fuse and then around cleat above cap well.

(3) Dual priming is outlined in *d* below.

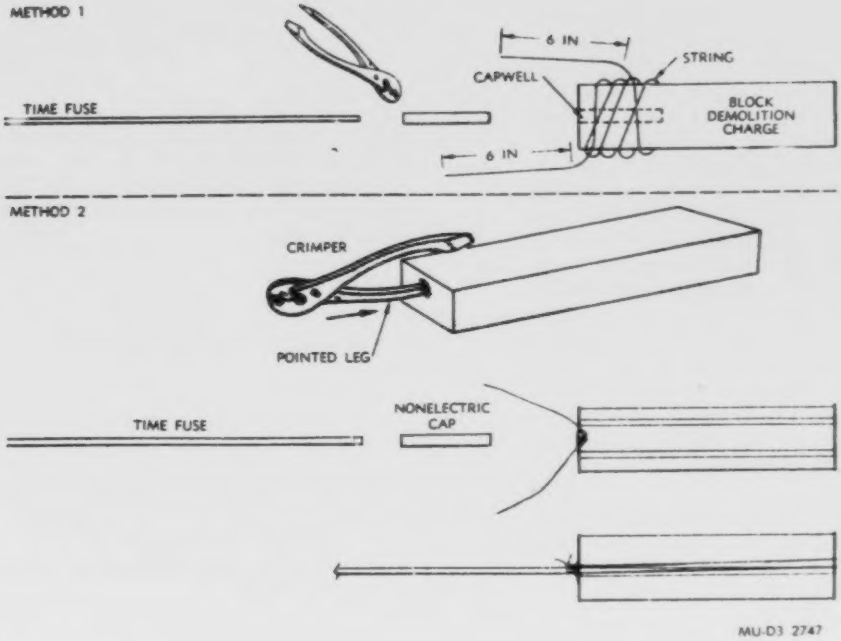

Figure 2-22. Nonelectric priming without priming adapter.

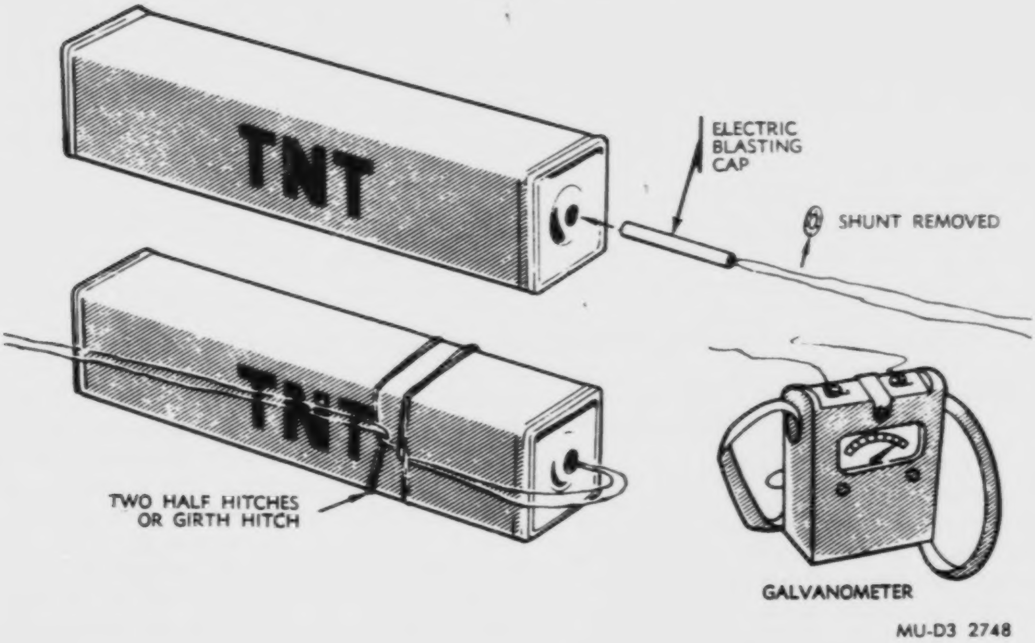

Figure 2-23. Electric priming of demolition block without priming adapter.

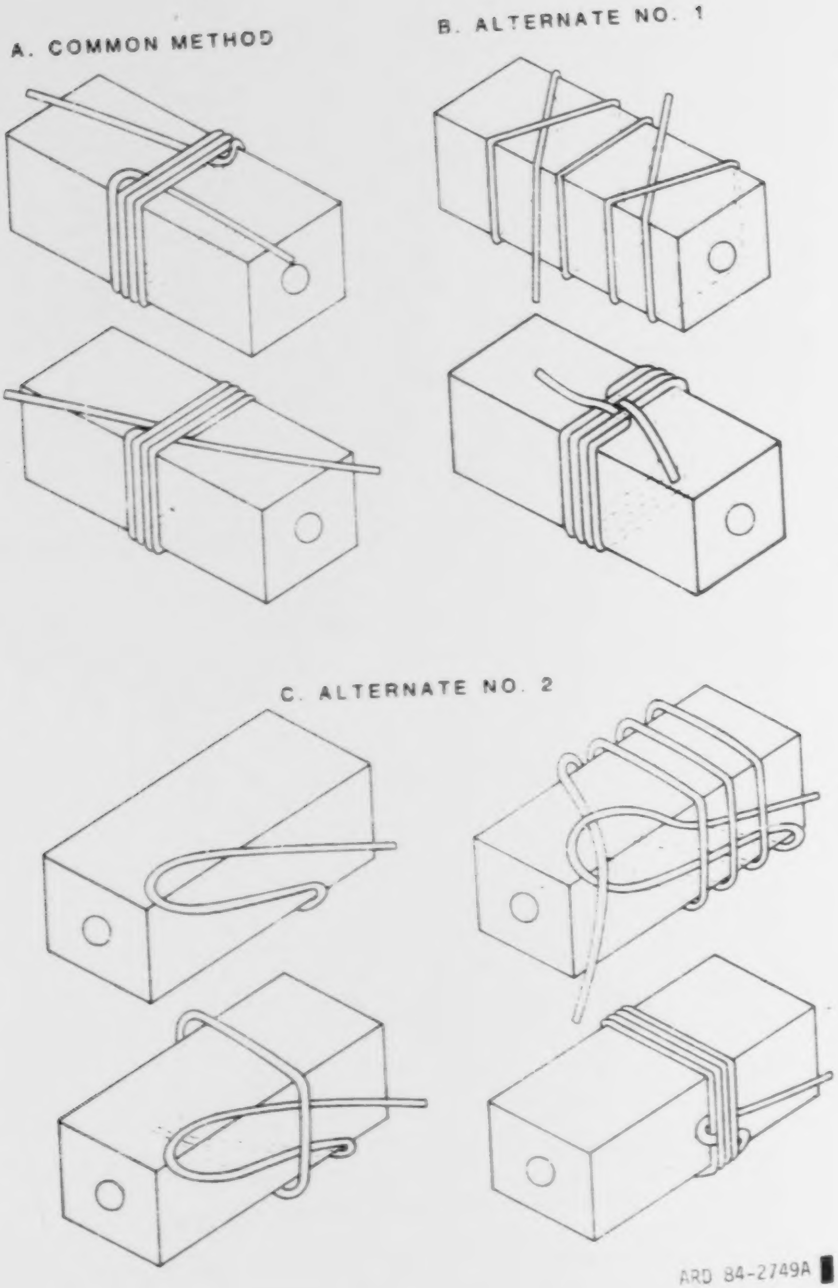

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Figure 2-24. Detonating cord priming of demolition blocks.

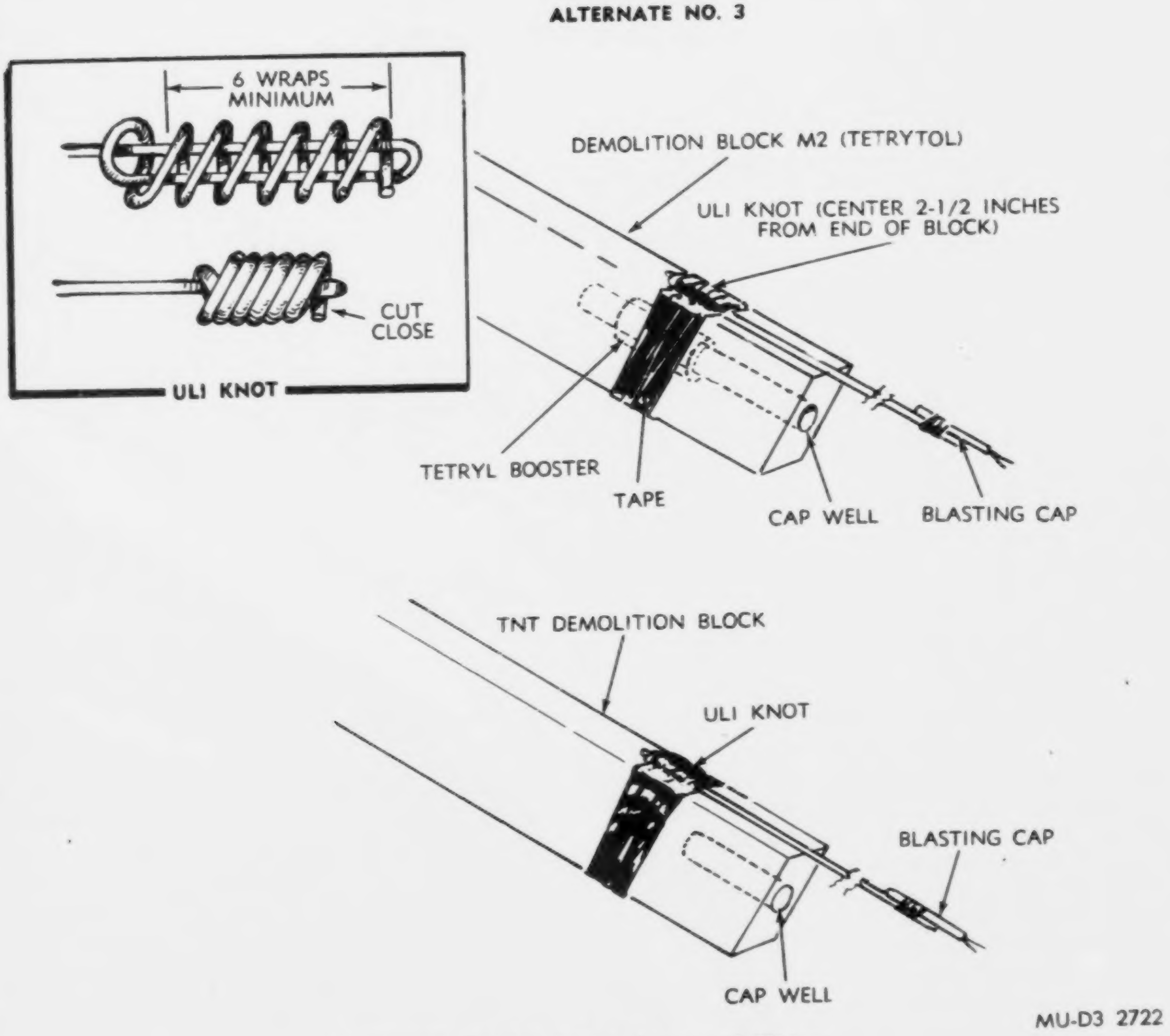

Figure 2–25. Priming of block charges with Uli knot.

b. Electricity Priming (fig. 2–26).

(1) Place electric blasting cap in cap well on side of container.

(2) Tie cap lead wires around cleat above cap well.

(3) Dual-prime as outlined in *d* below.

c. Detonating Cord Priming (A, fig. 2–27).

(1) Pass end of detonating cord through detonating cord tunnel on side of can.

(2) Tie an overhand knob on portion passed through can. Assure that knot is at least 6 inches from end.

(3) Dual-prime as outlined in *d* below.

d. Auxiliary Booster Priming (B, fig. 2–27).

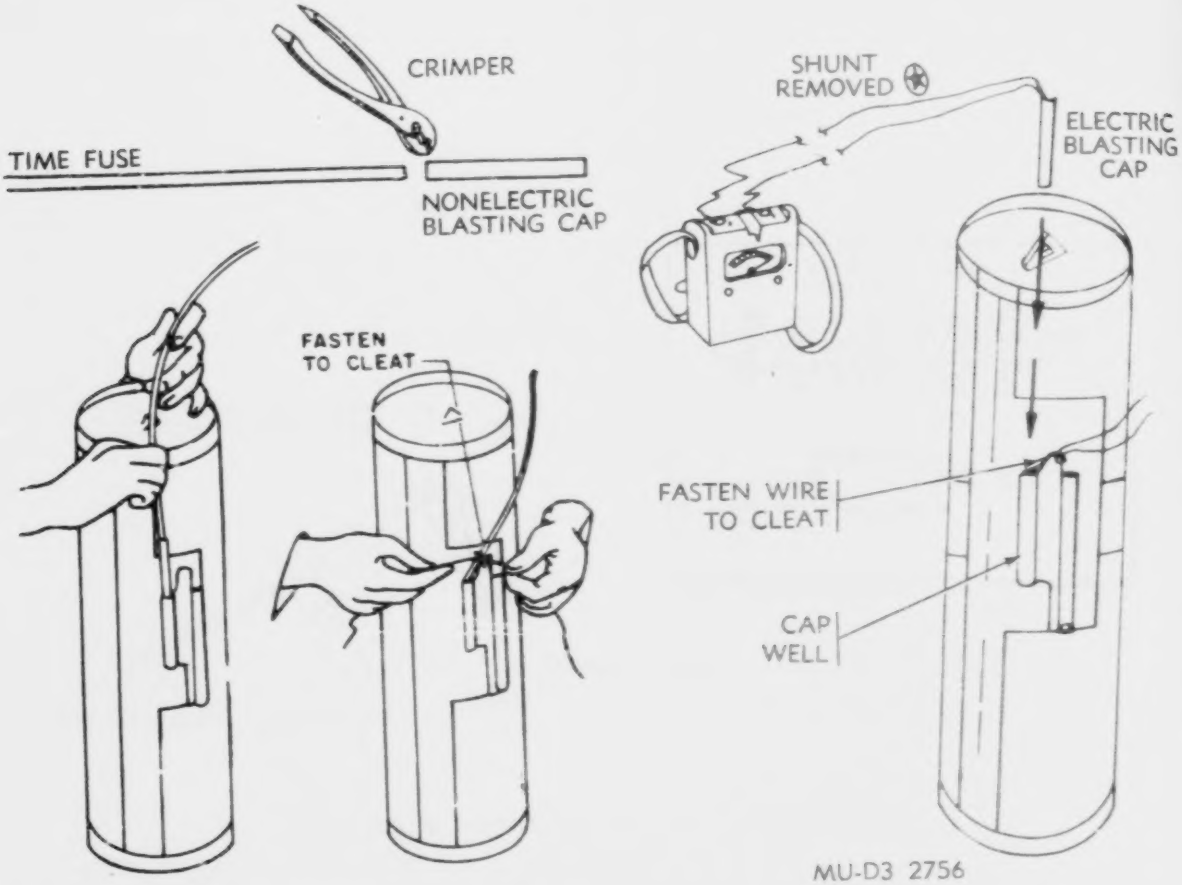

Figure 2-26. Nonelectric and electric priming of ammonium nitrate cratering charge.

Ammonium nitrate cratering charges must be dual-primed with a 1-pound TNT block demolition charge taped to side of cratering charge near cap well or detonating cord tunnel. Prime TNT block demolition charge by same method as cratering charge. Both charges should be primed to detonate simultaneously.

2-19. Priming Charges with No Cap Well (Block Demolition Charges C4 and C3, Sheet Charges M118 and M186, and Military Dynamite M1)

a. Composition C4 and C3.

(1) *Nonelectric priming.*

(*a*) Using a pointed nonsparking instrument or pointed handle on crimper M2, make a hole in end of block demolition charge (method 2, fig. 2-20). Assure that hole is large enough to contain nonelectric blasting cap.

(*b*) Using string, wrap several turns around explosive and tie knot. Position tie so it will be at top of hole when fused cap is inserted.

(*c*) Insert fused cap into hole.

WARNING

Never try to force a cap into an expedient cap well that is too small to admit it easily. Remove cap and enlarge hole.

(*d*) Tie string around time fuse at top of hole with two half hitches. Do not tie string so tightly that powder train is broken in fuse.

(*e*) Mold the explosive into the desired shape and using a nonsparking instrument, make a hole into the explosive and insert the cap into the hole and secure in place.

(2) *Electric priming.*

(*a*) Make a capwell as described in *a* above and figure 2-22.

(*b*) Untwist free ends of lead wire and fasten to firing wire.

(*c*) Insert electric cap into cap well and tie lead wires around charge by two half hitches, or one girth hitch (fig. 2-23). Allow some slack in wires between blasting cap and tie to prevent any pull on blasting cap.

(*d*) Mold the explosive into 'the desired shape and using a nonsparking instrument, make a hole into the explosive and insert the cap into the hole and secure in place.

(3) *Detonating cord priming.* To prime plastic explosives with detonating cord, form either of two knots shown in figure 2-28. Then insert knot into a block charge or a molded piece of explosive as shown. In either case, insure that there is at least 1/2 inch of explosive on sides of knot and at least one inch at end of knot.

b. Sheet Charges (Demolition Charges M118 (Sheet) and M186 (Roll)).

(1) *Nonelectric and electric priming.* Demoli-

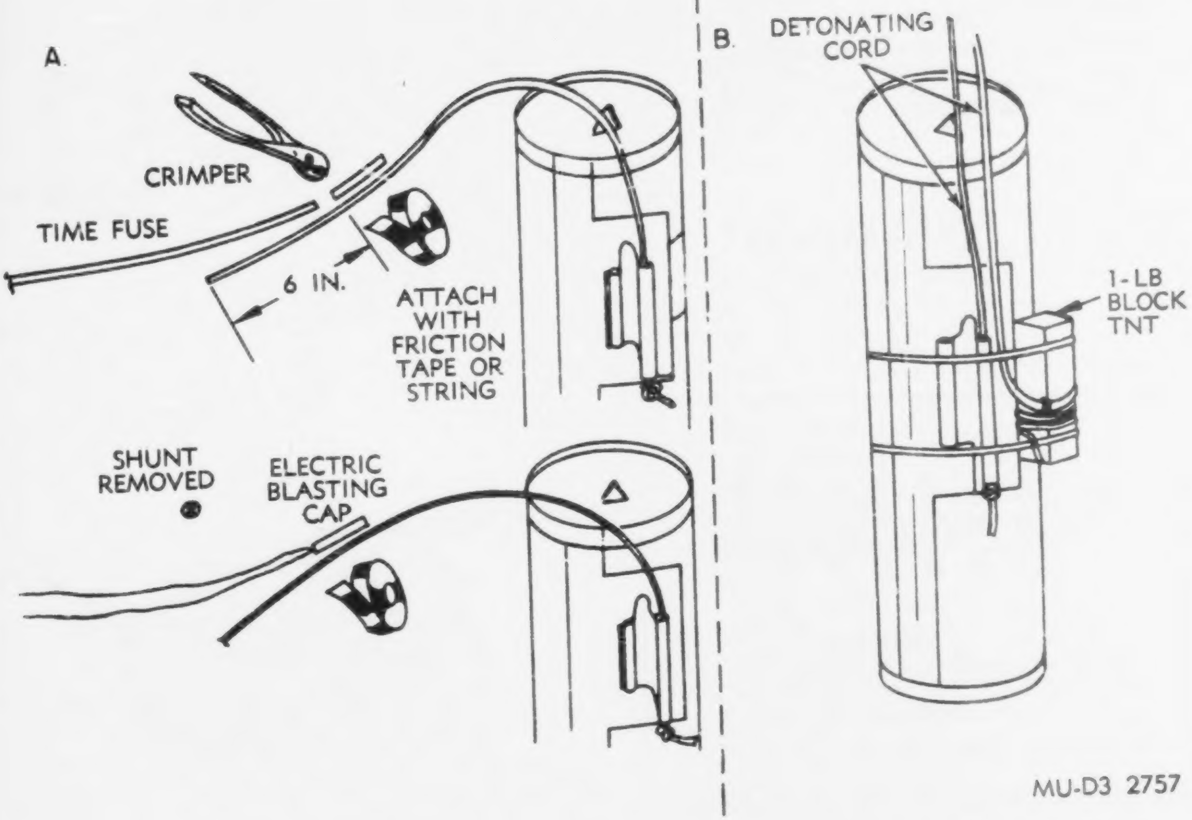

Figure 2-27. Detonating cord priming and auxiliary booster priming of cratering charge.

tion charges M118 and M186 may be primed as follows:

(*a*) *Method one.* Attach blasting cap holder M8 (para 1-12*e*) to one end or side of sheet explosive and insert electric or nonelectric blasting cap in holder until end of cap presses against sheet explosive (A, fig. 2-29).

(*b*) *Method two.*

WARNING

Cut sheet explosive with sharp knife on nonsparking surface. Do not use shears.

Cut notch approximately 1½ inches long and ¼ inch wide in sheet charge and insert blasting cap to limit of notch; secure blasting cap with string, tape, or strip of sheet charge (B, fig. 2-29).

(*c*) *Method three.* Place blasting cap on top of sheet charge and secure with strip of sheet charge at least 1½ inches by 3 inches (C, fig. 2-29).

(*d*) *Method four.* Insert end of blasting cap 1½ inches between two sheets of charge (D, fig. 2-29).

(2) *Detonating cord priming.*

(*a*) Sheet charges may be primed with detonating cord by attaching a nonelectric blasting cap to end of detonating cord and following methods outlined in (1) above. Detonating cord is then attached to a nonelectric or electric initiation system.

(*b*) If blasting caps are not available, sheet charges can be primed with detonating cord, using Uli knot (fig. 2-28). Secure knot to charge by taping, by placing it between 2 sheets of explosive, or by fastening it with a 3-inch square of sheet explosive.

c. Military Dynamite M1. Dynamite (para 1-11) can be primed at either end or at side. End priming is used when a whole case is fired or

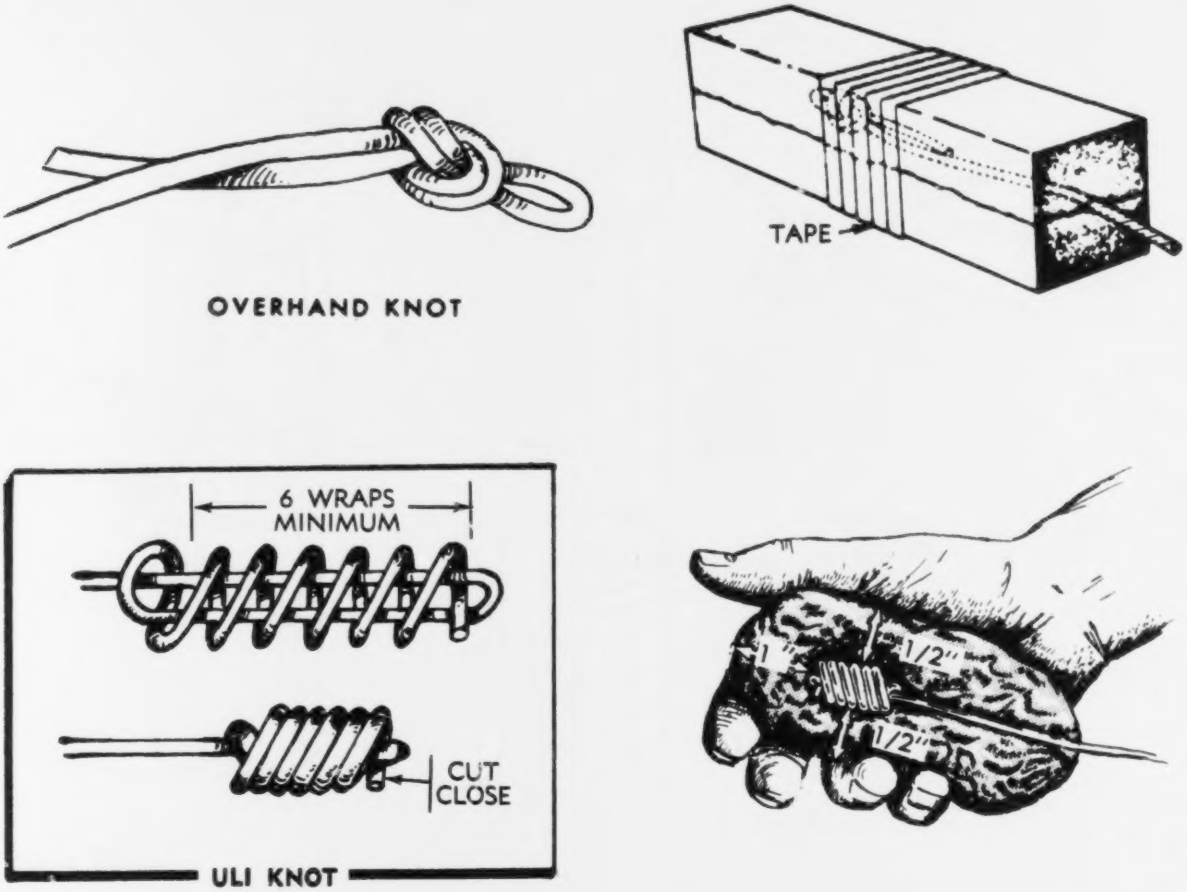

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Figure 2-28. Detonating cord priming of plastic explosives.

when charges placed require no tamping. Side priming is used when charge is placed in a tamped borehole to prevent damage to primer during placement and tamping.

(1) *Nonelectric priming.*

(*a*) *End priming method* (A, fig. 2-30). Using cap crimpers, make cap well in end of dynamite cartridge and insert fused blasting cap. Tie cap and fuse securely in cartridge with string.

(*b*) *Weatherproof end priming method* (B, fig. 2-30). This method helps weatherproof the primed charge. Unfold wrapping at folded end of dynamite cartridge and make cap well in exposed dynamite using cap crimpers. Insert fused blasting cap into cap well, close wrapping, and fasten securely with string or tape. Apply weatherproofing to tied string or tape.

(*c*) *Side priming method* (fig. 2-31) Using cap crimpers, make cap well about 1½ inches from one end of dynamite cartridge. Slant cap well so that blasting cap, when inserted, will be nearly parallel with side of cartridge, and explosive end of cap will be at about the middle of the cartridge. Insert fused blasting cap. Fasten securely by tying string to fuse and then wrapping it around cartridge, making two or three turns before tying. The primed cartridge may be weatherproofed by wrapping a string closely around cartridge, extending it an inch or so on each side of hole to cover it completely. Cover string with weatherproof sealing compound.

(2) *Electric priming.*

(*a*) *End priming method* (A, fig. 2-32). Using cap crimpers, make cap well in end of dy-

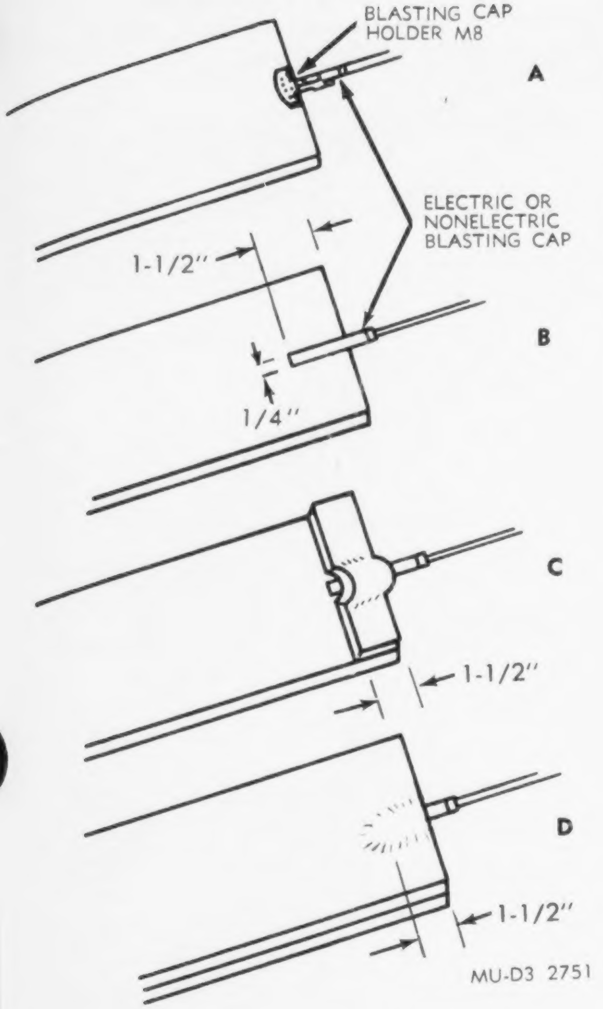


Figure 2-29. Priming sheet explosive.

namite cartridge and insert electric blasting cap. Tie cap lead wires around cartridge with two half hitches or a girth hitch.

(*b*) *Side priming method* (B, fig. 2-32). Make a cap well in side of dynamite cartridge and insert an electric blasting cap as outlined in *c*(1)(*c*) above. Tie cap lead wire around cartridge with a girth hitch or two half hitches, or fasten with string or tape.

(3) *Detonating cord priming.*

(*a*) Dynamite cartridges may be primed with detonating cord by attaching nonelectric blasting cap to end of detonating cord and following any of the methods for nonelectric priming outline in (1) above.

(*b*) Dynamite may be primed by lacing detonating cord through it. This is used chiefly in boreholes, ditching, or removal of stumps. Punch four equally-spaced holes through dynamite cartridge. Lace detonating cord through holes as shown in figure 2-33A.

(*c*) Dynamite cartridges may also be primed by taping a Uli knot (fig. 2-28) to the outside, or by inserting knot inside end and securing with tape or string.

(*d*) Dynamite cartridges may also be primed by laying a single strand of detonating cord four times on the length of the cartridge as shown in figure 2-33B. Firmly secure the detonating cord to the cartridge with tape or string.

2-20. Detonator, Percussion: M1A2 (15-Second Delay and M2A1 (8-Second Delay)

(figs. 1-18 and 1-19)

Except for delay period, marking, and shape of pull ring, 8-second delay percussion detonator is identical in construction, functioning, and use to 15-second delay percussion detonator.

a. Operation.

WARNING

Once pull ring has been pulled, it must be assumed that delay fuse has been ignited because it gives little or no indication it is burning. Do not attempt to neutralize or refunction detonator after pull ring has been pulled.

(1) Remove cap protector.

(2) Screw into threaded cap well in explosive.

(3) Place charge.

(4) Remove safety pin.

(5) Pull pull ring to fire and leave area immediately. Do not stop to investigate the installation.

b. Misfire.

WARNING

Do not handle or disturb detonator. Detonate by placing a 1-pound charge on top of misfired charge and repeat waiting time below.

Wait ½ hour after delay detonator was activated before approaching suspected misfire.

c. Neutralizing. If pull ring has not been pulled, proceed as follows:

(1) Reinsert safety pin.

(2) Unscrew detonator from charge.

(3) Replace cap protector.

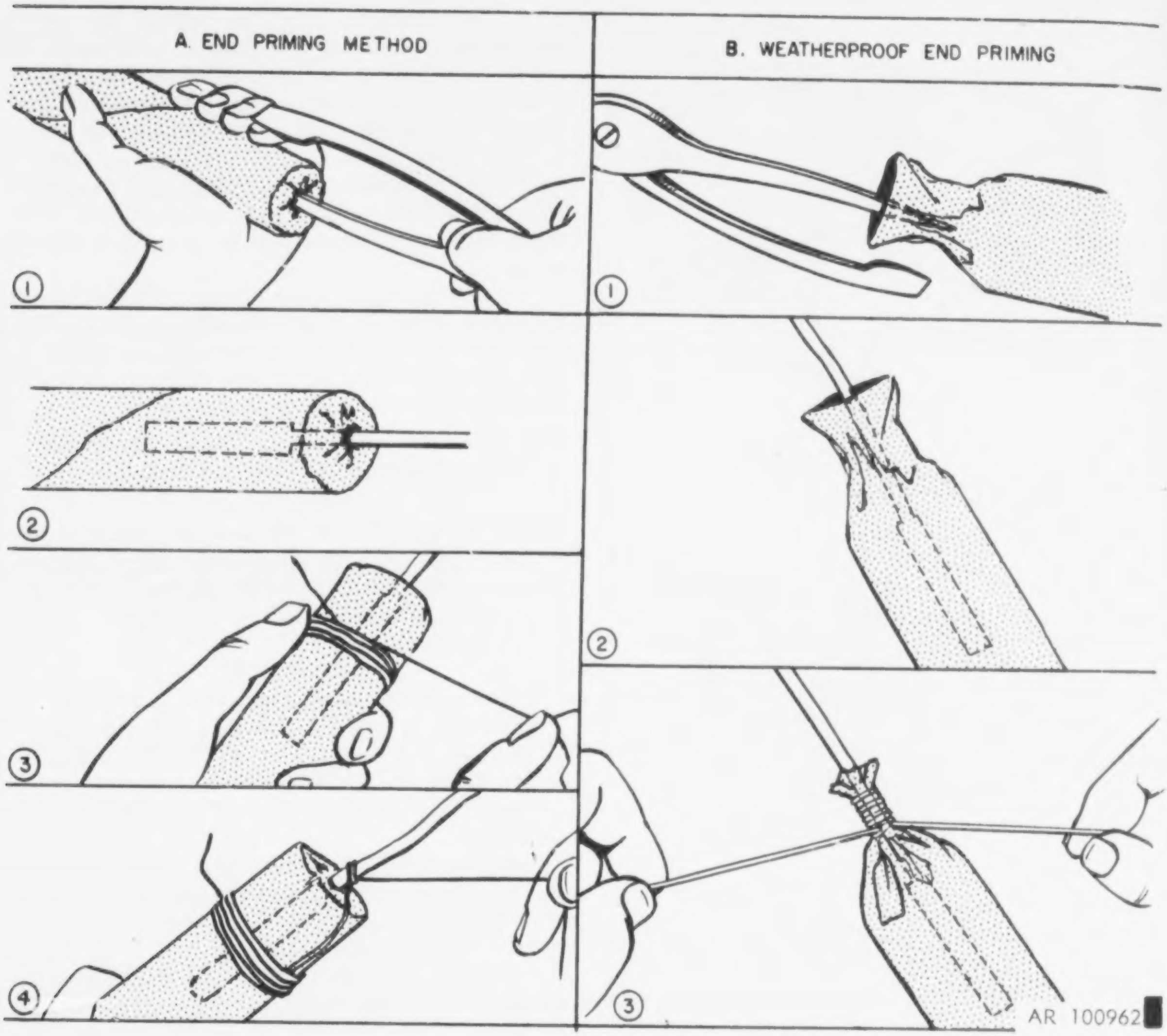


Figure 2-30. Nonelectric end priming of dynamite.

2-21. Concussion Detonator Kit M1
(fig. 1-44)

a. Safety Precautions.

(1) *Arming time in water.* Since salt delay pellets become soft before they are completely dissolved, the device is dangerous after half the arming time (as determined by the test) elapses. Therefore, personnel should be clear of danger area within half the arming time so determined. This is because a nearby concussion from enemy bombs, projectiles, or other causes could fire device after salt delay pellet has softened. The initiating charge should not be fired until full dissolving time of salt delay pellet has elapsed.

(2) *Arming time in air.* The device in an air installation becomes fully armed as soon as safety cotter pin is removed; therefore, personnel should be clear of danger zone immediately removal of safety cotter pin.

(3) *Pellet sleeve cover.* This cover fits over pellet sleeve and completely protects salt delay pellet from dissolving during placement in an underwater installation. Cover should not be removed until last possible moment before pulling safety cotter pin.

b. Preparation for Firing. Refer to table 2-5 for operating range of concussion detonation kit.

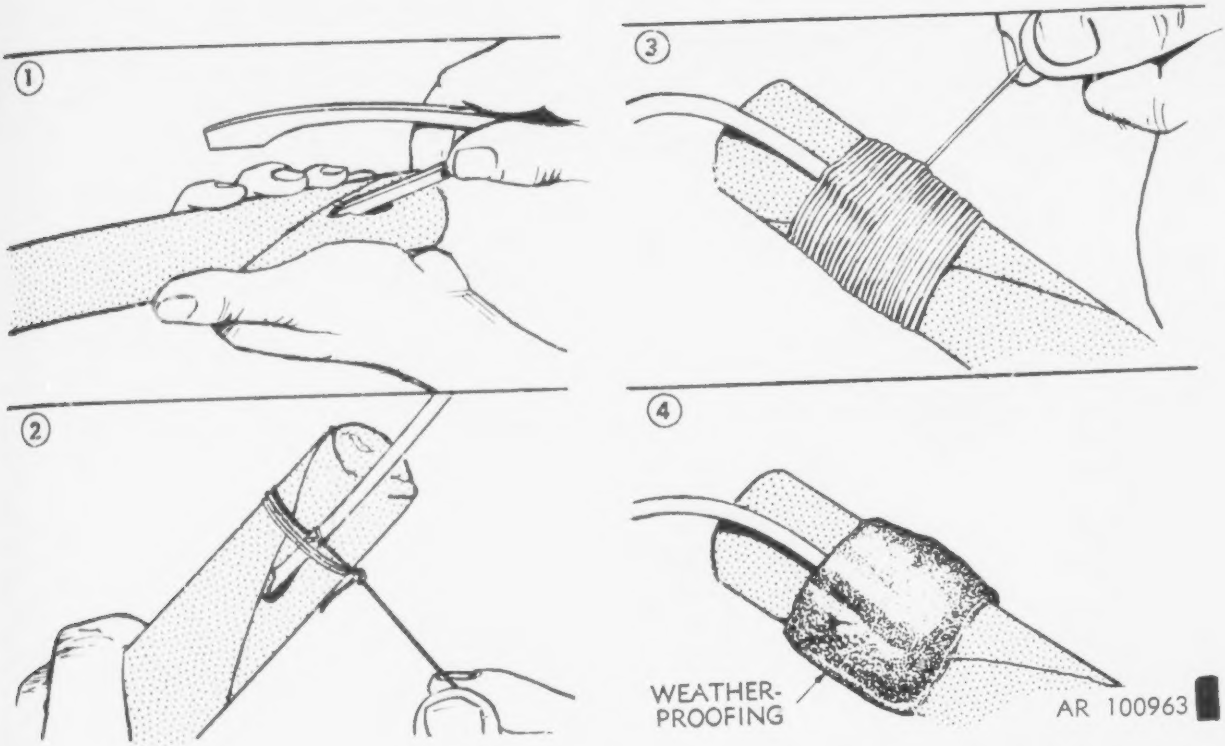


Figure 2-31. Nonelectric side priming of dynamite.

Table 2-5. Operating Range of Concussion Detonator Kits

Weight of initiating charge (lb)	In water		In air
	Depth of water (ft)	Recommended range (ft)	Recommended range (ft)*
0.5	2	10	
0.5	4	50	
0.5	6	80	
0.5	8	80	
2.5	2	20	12.5
2.5	4	80	
2.5	6	90	
2.5	8	150	
5			14.1
10			18.8
15			21.5
20	2	20	25.2
20	4	80	
20	6	180	
20	8	260	

*99 percent probability that detonator at indicated distance will be caused to function by initiating charge.

(1) *In water.*

(*a*) *Salt delay pellet test procedures.*

1. Dissolving times for salt pellets (blue—3½ minutes; yellow—7 minutes) are approximate. Dissolving time depends on water temperature, type of water (salt or fresh), and depth and movement of water in place where concussion detonator will be used. If time and circumstances permit, expend a detonator to determine arming time. Conduct test as close to operational conditions as possible.

2. Assemble kit as instructed in (*b*)*1* through *7* below.

3. Leave base plug (shipping plug) in place.

4. Install delay pellet to be tested. Replace protective cover.

5. Submerge and secure detonator in desired position.

6. Remove carboard protective cover and safety pin. Start timing.

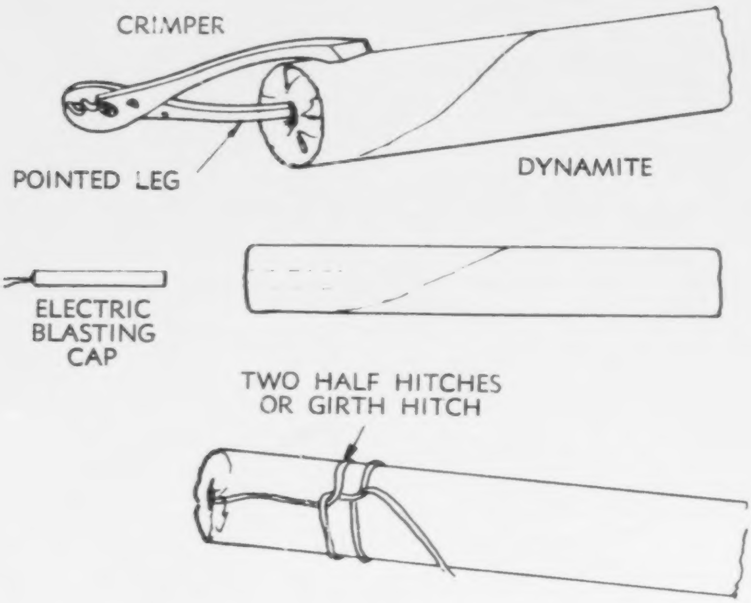
7. After half the suggested delay time has elapsed, apply pressure to diaphragm, using eraser end of pencil to determine if firing pin will snap. Repeat this procedure every 30 seconds.

8. The arming time determined above is only approximate even if test was done in exact position that operational detonator will occupy. Final result should be within ±30 seconds if conditions are consistent.

(*b*) *Assembly* (fig. 2-34).

1. Remove kit from its waterproof container.

A. END PRIMING METHOD



B. SIDE PRIMING METHOD

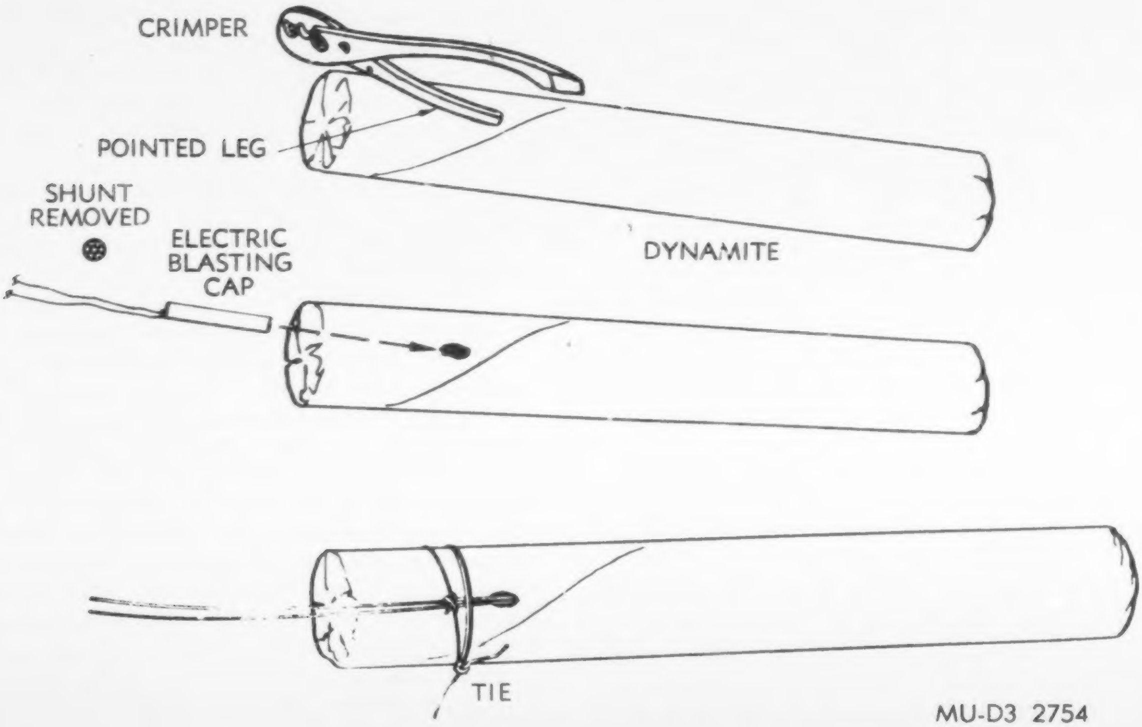


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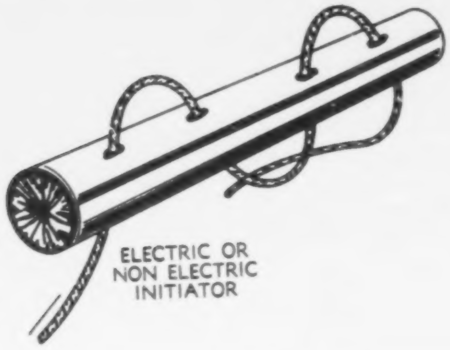
Figure 2-32. Electric priming of dynamite.

A. DETONATING CORD LACED THROUGH CARTRIDGE



B. DETONATING CORD TIED OR TAPED TO CARTRIDGE

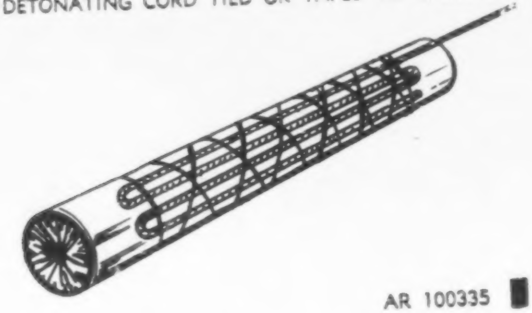


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Figure 2–33. Detonating cord priming of dynamite.

2. Remove pellet sleeve cover from firing mechanism.

3. Unscrew slotted sleeve plug from pellet sleeve.

4. Inspect interior of pellet sleeve to insure that safety cotter pin is holding spacer in place.

5. Depending on delay required, insert a blue (3 1/2 minutes) or yellow (7 minutes) delay pellet.

6. Reinstall slotted sleeve plug in pellet sleeve to secure pellet.

7. Reinstall pellet sleeve cover.

8. Remove base plug (shipping plug). Carefully screw in coupling base and blasting cap assembly with its associated gasket into firing mechanism to form a watertight joint.

9. Screw concussion detonator, which includes attached coupling base and blasting cap assembly, into threaded cap well of each demolition charge. An alternative method is to connect blasting cap to charge with a suitable length of detonating cord.

10. Wire or tie device to demolition charge and make sure diaphragm is free of obstructions and is clearly exposed.

11. Emplace demolition charges.

12. Remove pellet sleeve covers from pellet sleeves and start timing.

13. Remove safety cotter pin.

14. Evacuate danger area within 1/2 the arming time as observed in test ((*a*) above).

15. Wait full interval of arming time before firing initiating charge.

(2) *In air.*

(*a*) *Firing pin release spring test.* When concussion detonator is used in air, no salt delay pellet is used. In this case, when safety cotter

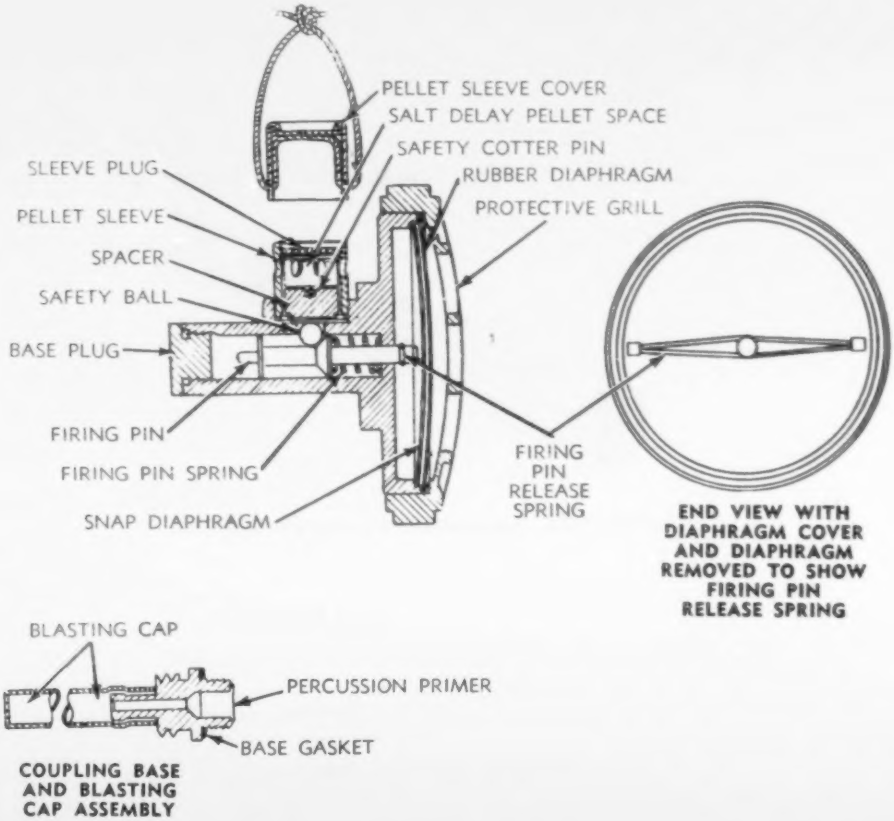

Figure 2-34. Concussion detonator kit M1—cutaway view.

pin is pulled, the steel safety ball restraint on the firing pin is removed. Hence, the only restraint to firing pin is that afforded by firing pin release spring. Test the concussion detonator to make sure that firing pin release spring restrains firing pin when safety cotter pin is withdrawn and spacer is released. Perform test as follows:

WARNING

Do not look into the opening while removing the safety pin as the firing pin may jump out.

1. Remove base plug.

2. Insert a blunt instrument into the opening and apply slight pressure on the firing pin. Remove the safety pin. The firing pin should creep forward about 1/16 of an inch.

3. If firing pin falls or jumps out of barrel, concussion detonator is unserviceable.

(*b*) *Assembly.*

1. If firing pin release spring passes test ((*a*) above), push spacer against safety steel ball, forcing firing pin to its original position. Replace safety cotter pin in its original position through pellet sleeve and spacer.

2. Remove base plug (shipping plug). Carefully screw in coupling base and blasting cap assembly with its associated gasket firmly into firing mechanism.

3. Screw device with attached coupling base and blasting cap assembly into threaded cap well of demolition charge of mine. An alternative method is to connect blasting cap to charge with appropriate length of detonating cord.

4. Wire or tie detonator to demolition charge and make sure that diaphragm is free of obstructions and is clearly exposed.

5. Emplace demolition charge with diaphragm of concussion detonator facing initiating charge.

6. Remove pellet sleeve cover. Withdraw safety cotter pin, thus arming concussion detonator.

7. Evacuate area immediately.

8. When personnel are clear of danger zone, fire initiating charge.

c. Disarming. If it is necessary, before firing, to disarm percussion detonator, follow instructions below:

(1) Insert a stick into pellet sleeve and push spacer against safety ball.

(2) While holding spacer down, reinstall safety cotter pin. If cotter pin cannot be reinstalled, release pressure on stick and tilt detonator so that diaphragm is facing downward. Again push on spacer with stick and reinstall safety cotter pin.

(3) Untie and unscrew percussion detonator from charge.

(4) Unscrew coupling base and blasting cap assembly from detonator.

(5) Reinstall base plug.

(6) Reinstall sleeve plug and sleeve cover on pellet sleeve.

(7) Repack in original packing.

2–22. Firing Device Coupling Base

(para 1–18)

WARNING

Do not attempt to remove an unfired primer from a coupling base.

A coupling base may be used for firing several primers before replacement is necessary. The originally installed percussion primer M27 is replaced by percussion primer M2 or improved No. 3.

2–23. Delay-Type Demolition Firing Device M1

(fig. 1–21)

a. Safety Precautions.

(1) When screwing this device into an explosive item, it should be held with thumb and fingers gripping coupling that joins the two halves (copper and brass) of tube.

(2) Time delay starts when the ampoule is crushed—not when the colored identification and

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safety strip is withdrawn. Calculations must be made accordingly.

(3) Areas where explosives fuzed with this type of device have been installed and actuated should be especially so marked and recorded. Troops must not approach installed charges employing this type of delay firing device.

b. Preparation for Use (para 1-17*b*).

(1) Card found in each box of devices indicates color for delay times at prevailing temperature (table 2-6).

(2) Select firing device with strip of color corresponding to desired delay.

(3) Look through, or insert a nail or wire into, the inspection hole to ensure that firing pin has not been released. If firing pin has been released, nail cannot be pushed through. Examine copper half of firing device tube to see that it is not dented and that there is no evidence that glass ampoule of corrosive chemical has been crushed.

(4) Remove celluloid protective shipping cap from coupling base and crimp on a nonelectric blasting cap (fig. 2-35). Crimper jaws should be placed no further than ¼ inch from open end of blasting cap.

Table 2-6. Effect of Temperature on Delays of Delay-type Demolition Firing Device M1

Temp (deg F)	Black		Red		White		Green		Yellow		Blue		Temp (deg C)
	OM	ST	OM	ST	OM	ST	OM	ST	OM	ST	OM	ST	
−25			8.5 hr	3.3 hr	3 day	1.3 day							−32
0	8 hr	2.5 hr	45 min	20 min	17.5 hr	8 hr	2.6 day	1.2 day	8.5 day	3.8 day	23 day	10 day	−18
+25	36 min	16 min	25 min	11 min	5.5 hr	2.5 hr	17 hr	8 hr	2.0 day	20 hr	5.0 day	2.2 day	−4
50	15 min	7 min	17 min	8 min	2 hr	55 min	6 hr	2.7 hr	14 hr	6.0 hr	1.3 day	14 hr	+10
75	9 min	4 min	15 min	7 min	1 hr	27 min	2.5 hr	70 min	5.5 hr	2.5 hr	11.5 hr	5 hr	24
100	5 min	2.0 min	8 min	3.5 min	32 min	14 min	70 min	30 min	2.5 hr	65 min	5.2 hr	2.3 hr	38
125	4 min	1.5 min	5 min	2 min	20 min	9 min	35 min	15 min	80 min	36 min	2.5 hr	1.1 hr	52
150	3 min	1 min	4 min	1.5 min	15 min	6 min	20 min	9 min	46 min	21 min	80 min	36 min	66

OM—Most likely delay if two devices are used in the same charge. If only a single device is used, this value should be increased approximately 15 percent.
ST—Reasonable safe time. Delays of less than this value should not occur more than one in a thousand.

(5) Secure firing device in demolition charge or explosive device.

(6) Crush ampoule between thumb and fingers.

(7)

WARNING

If safety strip does not remove easily, do not force it. Remove device from charge and discard without removing safety strip. Firing pin could be released by the handling required to remove a jammed strip.

Remove safety strip.

(8) If firing pin has not been released, withdraw strip.

c. Misfires.

(1) Exercise special care since firing device may be mechanically jammed and can fire if disturbed when in this condition.

(2) Delay type devices tend to have longer delays as they age. Always allow at least twice anticipated functioning time at operating temperature (table 2-5), plus half an hour, before approaching suspected misfire when nominal delay of device is less than 2½ hours. When delay is more than 2½ hours, wait at least twice the time before approaching.

(3) Unless it can be positively observed that firing device's striker (firing pin) has functioned, do not handle misfired device. Detonate by placing a 1-pound demolition charge on top of or next to misfired charge.

2-24. Pressure-Type Demolition Firing Device M1 and M1A

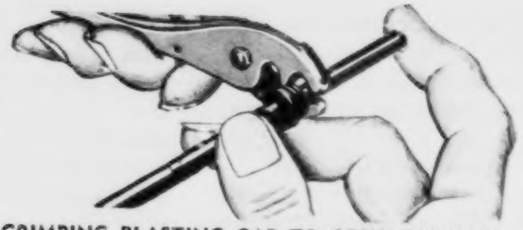
(figs. 1-22 and 1-23)

a. Preparation for Use.

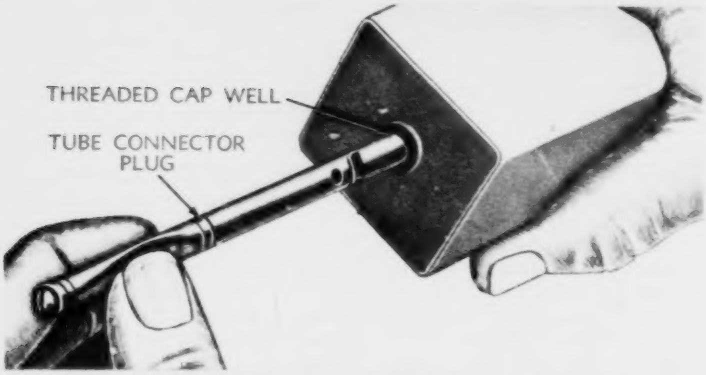
(1) *Inspection before use.* Check firing mechanism as follows:

(*a*) Unscrew coupling base from firing mechanism and inspect primer. Invert coupling base and hold it against firing mechanism, with nipple extending into threaded end of firing mechanism.

(*b*) Holding coupling base firmly against case, remove safety fork and safety pin. Depress



CRIMPING BLASTING CAP TO COUPLING BASE



CRUSHING GLASS AMPOULE IN TUBE WITH SAFETY STRIP STILL IN PLACE

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Figure 2-35. Delay-type demolition firing device M1—method of installation.

pressure cap. Firing pin should strike nipple end of coupling base sharply, indicating proper functioning of firing mechanism.

(*c*) Recock firing mechanism by pushing firing pin inward with unsharpened end of a pencil or a small blunt rod and, at the same time, pressing downward on pressure cap, so that end of firing pin can pass through enlarged portion of keyhole in firing pin release pin.

(*d*) Release pressure on pressure cap to allow narrow part of keyhole to engage groove on spindle.

(*e*) Replace safety pin and safety fork. Safety pin and safety fork should be free enough for easy removal after firing device has been installed.

(*f*) Screw coupling base into firing mechansim handtight. This restores firing device to original condition.

(2) *Installation and arming.*

(*a*) Remove protector tube from nipple, crimp a nonelectric blasting cap on nipple, and then screw firing device, with safety fork and safety pin in place, into a mine or other explosive charge.

(*b*) Bury and anchor assembled mine and firing device on a firm flat foundation.

(*c*) Place or arrange some suitable object, such as a pressure board, in contact with, but not bearing on, pressure cap. If the particular object does not touch pressure cap, screw extension rod into pressure cap and adjust by unscrewing rod until it is snug against object and then backing rod away one quarter turn to relieve any pressure on pressure cap. If tri-pronged pressure head is to be used, screw it into pressure cap and adjust in same manner. Extension rod and tri-pronged pressure head are illustrated in insert in figure 1-22.

(*d*) Remove safety fork. It should pull off easily. A sudden jerk may cause firing device to function. If safety fork does not pull off easily, check installation to make sure there is no pressure on pressure cap.

(*e*) Using attached cord, pull out safety pin slowly and carefully. If safety pin resists a gentle pull, firing pin may have been released and is pressing against it. In such a case, replace safety fork, remove installation, and remove firing device from mine. Unscrew coupling base and check firing mechanism. If firing mechanism is defective, replace it.

(*f*) Retain safety fork and safety pin for subsequent use in disarming.

b. *Neutralizing.*

(1) Carefully insert safety pin into case of firing device, and install safety fork.

(2) Take up assembled firing device and mine or demolition charge.

(3) Remove firing device from mine or demolition charge.

(4) Unscrew coupling base and destroy, or store in safe place. Return firing mechanism to original packing.

2–25. Pressure-Release-Type Demolition Firing Device M5

(figs. 1–24 and 1–25)

a. *Installing and Arming.*

(1) Inspect firing device to make sure that there are no obvious defects, that firing pin is cocked, and that safety pin is in proper position.

(2) Remove small cotter pin.

(3) Slip a common nail (6-, 8-, or 10-penny) or a length of 10-gauge wire through interceptor holes.

(4) Remove coupling base.

(5) Remove celluloid shipping cap from coupling base and crimp on a nonelectric cap (or secure into mine activator).

(6) Screw coupling base into firing mechanism.

(7) Screw device into threaded cap well of charge or auxiliary fuze well of mine. Install so that release plate is held closed by weight of a mine, charge, or a boobytrap bait, or is restrained by a wedge. If firing device is in the ground, use small board issued with device to provide solid foundation. See that safety pin is in proper position and adjust installation so that safety pin will slip out easily.

(9) Remove safety pin gently by pulling attached cord. If striker falls, it can be felt striking the interceptor hole nail or wire. (If this happens, remove restraining load and check device. If device is defective, discard it.) Recock device and repeat process.

(10) If no clicking sound is heard, pull out wire or nail from interceptor hole. It should come out easily.

b. *Neutralizing.*

(1) Insert wire or nail through interceptor holes.

(2) Insert safety pin.

(3) Remove restraining load.

(4) Insert cotter pin.

(5) Remove device from mine or charge.

(6)

WARNING

Do not attempt to remove blasting cap from coupling base.

Unscrew coupling base and destroy, or store in a safe place. Protector cap from used delay detonator may be used.

c. *Reuse.* To recock firing device for use with new coupling base or reprimed coupling base in training, proceed as follows:

(1) Remove coupling base.

(2) Hold firing mechanism with release plate up, hinge of release plate toword you.

(3) With nail held in right hand perpendicular to long axis of firing mechanism, force firing pin back to cocked position.

(4) Hold down release plate and withdraw nail.

(5) Insert safety pin.

(6) With release plate held down firmly, withdraw safety pin to see that it slides out easily; replace safety pin.

NOTE

Other methods of recocking may be used if found, satisfactory.

(7) Screw in new or reprimed coupling base.

2–26. Pull-Type Demolition Firing Device M1

(figs. 1–26 and 1–27)

a. *Preparation for Use.*

(1) *Inspection before use.* Check firing device as follows:

(*a*) Unscrew primed coupling base and inspect primer. Invert coupling base and hold it so that nipple end is inside case.

(*b*) Holding coupling base firmly against case, remove positive safety pin and head safety pin. Pull outward on pull ring. Firing pin should strike end of nipple sharply, indicating proper functioning of assembly.

(*c*) Recock firing device by pushing firing pin inward with unsharpened pencil or blunt rod until release pin slips into place, thus expanding slotted head of firing pin.

(*d*) Insert positive safety pin and head safety pin, then screw primed coupling base into case, primer end inward. Safety pins should be free enough for easy removal after firing device has been installed.

(2) *Installation and arming.*

(*a*) Remove primed coupling base.

(*b*) Remove protector cap from nipple and crimp on a nonelectric blasting cap (or screw into mine actuator). Screw primed coupling base into case (body).

(*c*) Screw firing device, with safety pins in place, into a mine or demolition charge.

(*d*) Install loose tripwire, attaching anchor end first. Unspool tripwire to mine. Before connecting tripwire to firing device, step off to the side and inspect for detectability of tripwire and mine. If necessary, rearrange installation to obtain adequate concealment.

(*e*) Attach free end of wire to pull ring, drawing up excess through pull ring so that wire is taut, but without strain.

(*f*) Remove head safety pin. If it does not pull out easily, tripwire may be too tight. Adjust tripwire if necessary. If head safety pin still binds, remove coupling base and check mechanism. If defective, replace faulty firing device with a serviceable one.

(*g*) Using attached cord, pull out positive safety pin slowly and carefully. If it resists a gentle pull, firing pin may have been released and is pressing against it, or leg spread of the positive safety pin is excessive. If leg spread is not excessive but the pin still resists gentle pull, install head safety pin, unscrew coupling base, and check mechanism. If defective, replace faulty firing device with a serviceable one.

(*h*) Retain safety pins for future use in disarming firing device.

b. Disarming and Removal.

(1) Carefully insert positive safety pin first, then head safety pin into firing device. After insertion, spread legs of safety pins just enough to prevent accidental loss of pins during handling and shipment.

(2) Disconnect tripwire from the pull ring.

(3) Unscrew firing device from mine or charge.

(4) Restore firing device to original condition and packing.

2-27. Pull-Release-Type Demolition Firing Device M3

(figs. 1-28 and 1-29)

Prepare for use as follows:

a. Inspect Before Use.

(1) Unscrew primed coupling base from firing mechanism and inspect primer.

(2) Inspect positive safety pin and safety pin, to see that they are in place, yet free enough for easy removal after firing device has been installed.

(3) Leaving positive safety pin and safety pin in position, pull winch assembly out with finger until it is stopped by the safety pin, then release. Repeat procedure two or three times. Winch assembly should move smoothly approximately 1/4 inch and should require a force of 6 to 10 pounds. If assembly hangs or moves jerkily or too easily, examine firing device. If fault cannot be corrected, use another firing device.

b. Installation and Arming

(1) Remove protector cap from nipple of primed coupling base and crimp on a blasting cap (or attach to mine activator).

(2) Screw coupling base into device body (fig. 2-36).

(3) Screw firing device (with positive safety pin and safety pin in place) into a mine or demolition charge.

(4) Secure tripwire at anchor end, making certain that this tie will not slip. Unspool tripwire to mine or charge. Before connecting tripwire to firing device, step off to the side and inspect for detectability of tripwire and mine. If necessary, rearrange installation to obtain adequate concealment.

(5) Attach loose end of tripwire to winch by threading it through hole in winch spindle.

NOTE

Wire must be threaded through hole in winch spindle, to prevent slippage and accidental functioning.

(6) Draw up excess wire through hole in winch spindle. Take up remaining slack by turning knurled knob until safety pin is pulled exactly

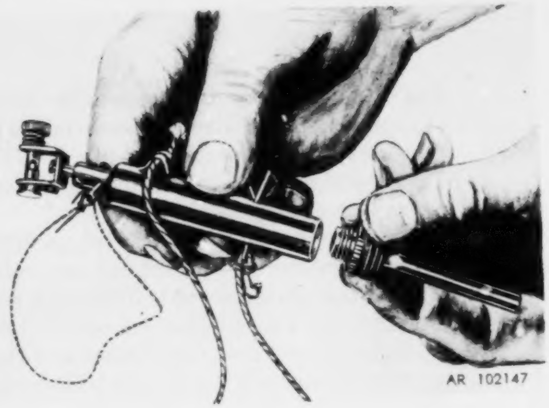


Figure 2-36. Assembling pull-release-type firing mechanism to primed coupling base crimped on blasting cap.

into midposition (wide portion) of its elongated hole in head.

(7) Remove small cotter pin from safety pin and then gently remove safety pin. If safety pin does not slide out easily, adjust winch winding until safety pin is loose enough to be withdrawn easily.

(8)

WARNING

When finally removing safety devices, remove them from a safe distance, using a string or length of wire for the purpose.

Using attached cord, pull out safety pin slowly and carefully. It should come out easily. If it resists a gentle pull,install safety pin and remove tripwire from winch by depressing knurled knob and stripping off wire. Remove coupling base and check mechanism. If defective, replace entire firing device.

(9)

WARNING

Do not attempt to neutralize device for recovery. Boobytraps utilizing firing device M3 must be neutralized by blowing in place.

Retain safety devices for subsequent use when undertaking training exercises without live explosives.

2-28. Release-Type Demolition Firing Device.

(figs. 1-30 and 1-31).

a. Preparation for Use.

(1) *Inspection before use.* Check firing device for any obvious defects. Make sure that safety pin is properly installed and that lever is latched in set position.

(2) *Installation and arming.*

NOTE

There is no cotter pin in the M1 firing device.

(a) Remove cotter pin in end of M5's safety pins.

(b) Slip a nail or stout wire through interceptor holes.

(c) Remove coupling base. Remove its protector cap and crimp on a nonelectric blasting cap (or attach to mine activator).

(d) Screw coupling base into firing mechanism.

(e) Screw firing device thus assembled into mine or charge.

(f) Provide a level surface at base of hole in which mine or charge (with firing device assembled) is to be planted. A board may be used for this purpose.

(g) Place assembled mine (or charge) and firing device in hole, with latch on firing device uppermost.

(h)

WARNING

Weight placed on latch must be greater than three pounds to prevent firing device from functioning when safety devices are withdrawn.

Place restraining weight on exposed surface of latch.

(i) Make sure that safety pin cord and interceptor wire are at ground level in convenient position for removal.

(j) Conceal installation.

(k) Gently withdraw safety pin by pulling on its cord. If it does not come out easily, load on the mine is too light or is improperly placed on latch. If resistance is met, uncover and check installation.

(l) Withdraw interceptor wire (wire should come out easily).

b. Neutralizing.

(1) Carefully uncover installation.

(2) Insert a nail or wire through interceptor holes.

(3) Insert safety pin.

(4) Remove restraining weight.

(5) Insert cotter pin.

(6) Remove mine (or charge) with its assembled firing device. Unscrew firing device (firing mechanism and coupling base) from mine or charge.

(7) Unscrew coupling base from firing mechanism.

(8)

WARNING

Do not attempt to remove blasting cap from coupling base.

Destroy coupling base with blasting cap attached, or store in a safe place.

(9) Restore firing mechanism to original condition and packing.

2-28.1. Firing Device Demolition Multipurpose M142

a. General Safety Precautions.

(1) Visually inspect for any obvious defects such as deterioration of components, corrosion, bent, broken or missing pins, etc.

(2) Do not remove safety pin that offers resistance; recheck setting.

(3) In attaching switch assembly to rough or uneven surface, avoid bending ears of switch by overtightening fasteners. (Bent ears will distort bore and result in malfunctions).

b. General Procedures. The following are general procedures for setting up the firing device. Operators must refer to the detailed procedures (*d* below) for setting up each specific mode of operation.

(1) Obtain necessary materials to set the firing device up for the desired mode of operation.

(2) Inspect components of firing device to assure there are no obvious defects.

(3) Prepare coupling body for desired mode of operation.

NOTE

Removal of the safety pin is the final step in all operating modes. If the safety pin is inadvertently removed prior to step 10, stop all procedures and refer to disarming procedures (*e*) below.

(4) When required by the specific operating mode, set up and secure switch and accessories (tripwire, tension release attachment etc.). Do not remove any pins at this time.

(5) Assure both round and square head pivot pins are in place. Check safety pin for ease of removal. Assure legs of safety pin are straight. If legs are bent, straighten and press them together with pliers.

(6) Screw coupling body into switch.

(7) Connect charge to coupling body's cap or fuse (or screw switch and coupling body into implanted mine or charge (Depending upon type of operation).

(8) Lay out and tension tripwire or set up restraining load, etc.

WARNING

If safety pin resists movement *do not* withdraw. Firing pin may have been released recheck assembly. Disassemble and reset as necessary (*e*(2) below)

(9) Assure safety pin is in place, but can easily be removed. Assure firing pin has not been released. Check that any inadvertent action or small motion cannot accidentally actuate switch.

(10) Remove appropriate pin to set mode of switch operation.

WARNING

All personnel but the prime installer (operator) should be evacuated from the area prior to pulling the safety pin.

(11) Using a lanyard (length of wire or cord) to remove safety pin take cover and pull the safety pin. Leave the area.

c. Use of Coupling Body or Coupling Base.

(1) Either a coupling body or a coupling base can be used in conjunction with the M142 firing device.

NOTE

The coupling body is functionally interchangeable with a standard coupling base that is used with a blasting cap (fig. 2-31D). The coupling base is used in the same manner as with other firing devices.

(2) The coupling body is threaded on both ends and contains a primer. The primer end screws into the switch. The other threaded end is fitted with a formed rubber gasket and a packing nut for use with nonelectric blasting caps, or a time fuse. Removal of the packing nut permits the coupling body to be threaded into munitions with matching threaded wells.

(*a*) For use with M700 time blasting fuse or old style safety fuse.

NOTE

M700 time blasting fuse forms a water tight seal with the coupling body, but the old style safety fuse is not considered water tight due to its corrugated surface.

1. Remove packing nut and gasket from coupling body.

2. Cut and discard a 6-inch length from end of fuse roll. Cut fuse to desired length.

3. Slide gasket and packing nut over end of fuse.

4. Push end of fuse into coupling body as far as it will go.

5. Thread on and tighten packing nut to secure fuse.

(*b*) For use with blasting cap.

1. Remove packing nut and gasket from coupling body.

2. Insert open end of blasting cap into coupling body and gently push it in as far as it will go.

NOTE

There is a slight interference fit. It is necessary to gently force cap into coupling body. This *will* bend the flared skirt of M7 caps slightly.

3. Slide gasket and packing nut over blasting cap, thread on and tighten to secure.

NOTE

If the coupling body and blasting cap are to be threaded (screwed) into a mine or demolition charge capwell, the packing nut and gasket are not required.

d. Modes of Operation.

(1) *Pressure* (fig. 2-38). In this mode of operation (fig. 2-39), the firing device functions when a load is applied to a pressure plate that is resting on the sear plate. The switch setting instructions are as follows:

(*a*) Assure both round and square-head pivot pins are in place. Check components to assure there are no obvious defects. Check safety pin for ease of removal. Assure legs of safety pin are straight. If legs are bent, straighten and press them together with pliers.

(*b*) Obtain a piece of wood or some other suitable object to act as a pressure plate, max 25 lbs (see warning step (*g*) below).

(*c*) Secure switch to a fixed object with nails or screws.

(*d*) Secure blasting cap or time fuse into coupling body as desired (*c* above).

(*e*) Assure safety pin is in place. Screw coupling body into switch.

NOTE

Removal of the safety pin is the final step in all operating modes. If the safety pin is inadvertently removed prior to step (*g*) stop all procedures and refer to disarming procedures (*e* below).

(*f*) Attach charge, etc, to coupling body as desired.

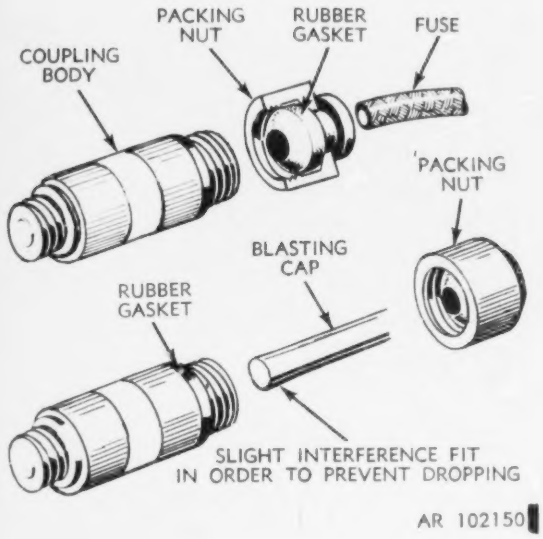


Figure 2-37. Coupling Body.

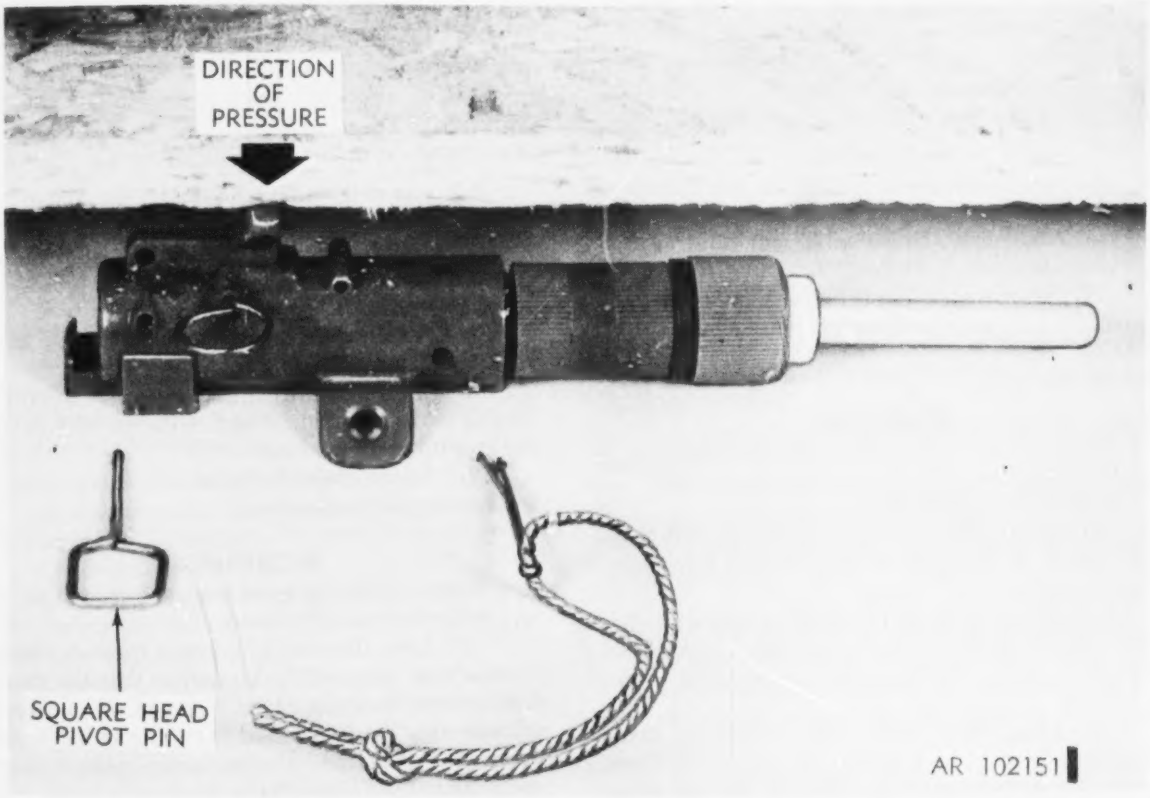


Figure 2-38. Position of firing device when set for pressure.

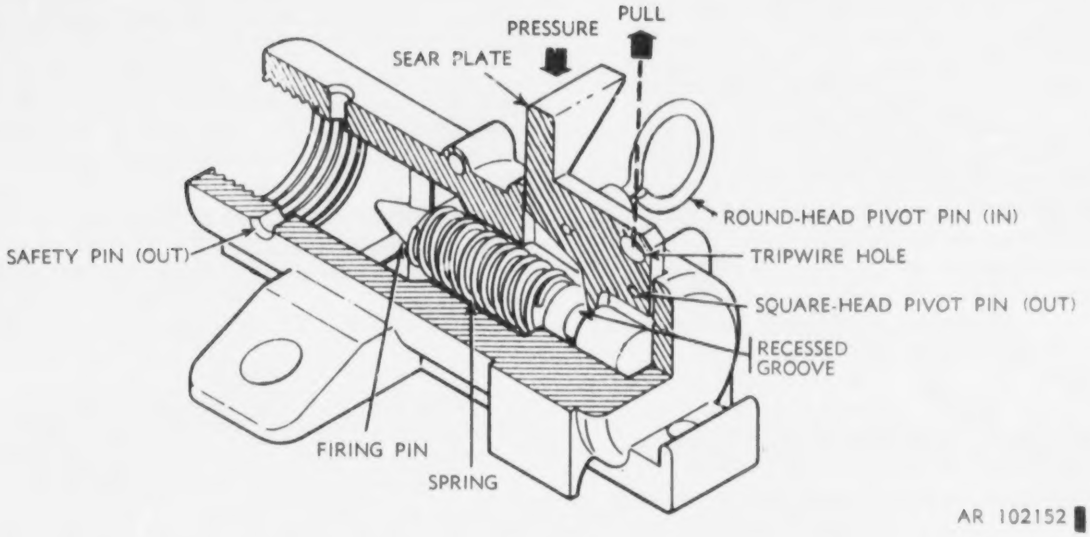


Figure 2-39. Switch set for pressure or pull action.

WARNING

The pressure plate must *not* be heavy enough to activate switch by itself.

(*g*) Place pressure plate to rest on Sear Plate. This should make the square-head pin easy to move, DO NOT REMOVE IT.

WARNING

If safety pin resists movement *do not* withdraw. Firing pin may have been released. Recheck assembly. Disassemble and reset as necessary (para 2-28.1e(2)).

(*h*) Assure safety pin is in place, but can be easily removed. *Do not remove safety pin.* Remove square head pin. Again check safety pin to assure firing pin was not released.

WARNING

All personnel but the prime installer (operator) should be evacuated from the area prior to pulling the safety pin.

(*i*) Using a lanyard (length of wire or cord) to remove safety pin, take cover and pull the safety pin. Leave the area.

(2) *Pull* (fig. 2-40). In this mode of operation (fig. 2-39), the firing device functions when the attached tripwire is pulled. The switch settings instructions are as follows:

(*a*) Assure both round and square-head pivot pins are in place. Check components to assure there are no obvious defects. Check safety pin for ease of removal. Assure legs of safety pin are straight. If legs are bent, straighten and press them together with pliers.

(*b*) Secure switch to a fixed object with nails or screws.

(*c*) Secure blasting cap or time fuse into coupling body as desired (*c* above).

(*d*) Assure safety pin is in place. Screw coupling body into switch.

NOTE

Removal of the safety pin is the final step in all operating modes. If the safety pin is inadvertently removed prior to step (*h*) stop all procedures and refer to disarming procedures (*e*).

(*e*) Attach charge, etc. to coupling body as desired.

(*f*) Layout tripwire. Direction should be perpendicular to the longitudinal axis of the switch (i.e. pulling up with respect to switch).

(*g*) Secure one end of tripwire to a tree, stake or some other stationary object.

WARNING

Make tripwire taut but not tight enough to activate switch (7 lb max).

(*h*) Loop other end of tripwire through tripwire hole in sear plate, adjust tension so that the square-head pin can be easily moved. Using pliers secure tripwire by twisting free end of tripwire around the taut tripwire. This should make the square-head pin easy to move. *DO NOT REMOVE IT.*

WARNING

If safety pin resists movement do not withdraw. Firing pin may have been released. Re-

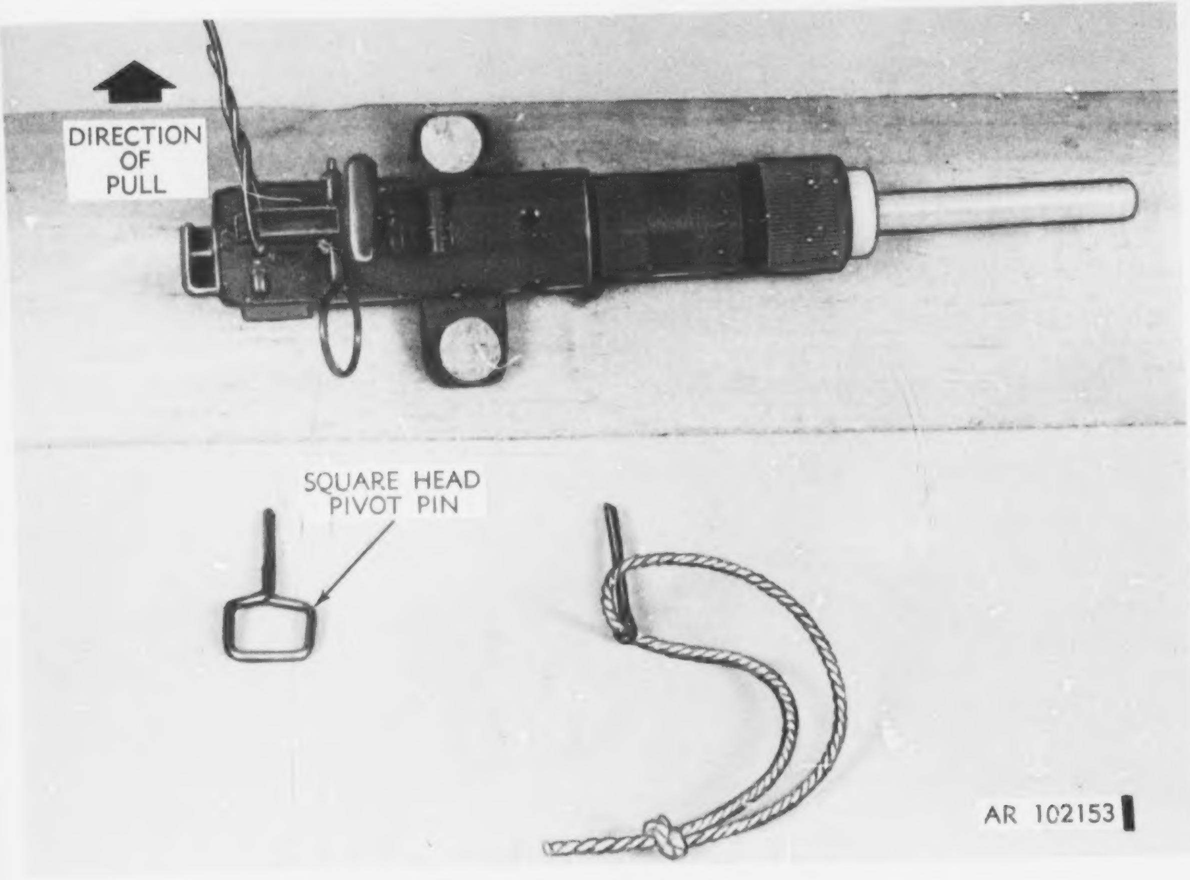


Figure 2-40. Position of firing device when set for pull.

check assembly. Disassemble and reset switch as necessary *e*(2).

(*i*) Assure safety pin is in place, but can easily be removed. DO NOT REMOVE SAFETY PIN. Remove square-head pin. Again check safety pin to assure firing pin was not released.

WARNING

All personnel but the prime installer (operator) should be evacuated from the area prior to pulling the safety pin.

(*j*) Using a lanyard (length of wire or cord) to remove safety pin take cover and pull the safety pin. Leave the area.

(3) *Pressure release* (fig. 2-41). In this mode of operation (fig. 2-42), the firing device functions when a load that is placed on the sear plate is removed. The switch setting instructions are as follows:

(*a*) Assure both round and square-head pivot pins are in place. Check components to assure there are no obvious defects. Check safety pin for ease of removal. Assure legs of safety pin are straight. If legs are bent, straighten and press them together with pliers.

(*b*) Obtain a piece of wood or some other suitable object to act as a (pressure) release plate, min 2 lbs (see step (*g*) below).

(*c*) Secure switch to a fixed object with nails or screws.

(*d*) Secure blasting cap or time fuse into coupling body as desired (2-28.1*c*).

(*e*) Assure safety pin is in place. Screw coupling body into switch.

NOTE

Removal of the safety pin is the final step in all operating modes. If the safety pin in inadvertently removed prior to step (*g*), stop all procedures and refer to disarming procedures (*e*).

(*f*) Attach charge, etc. to coupling body as desired.

WARNING

The weight of the (pressure) release plate

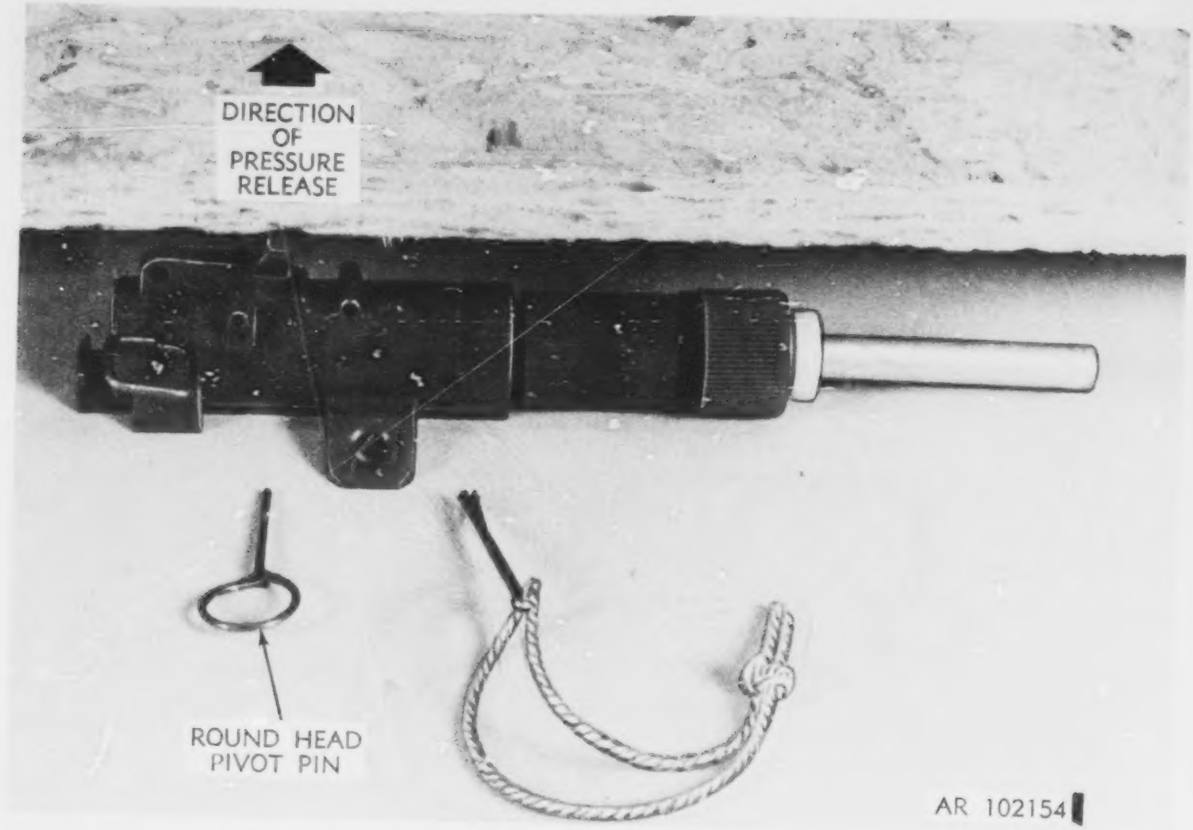


Figure 2-41. Position of firing device when set for pressure release.

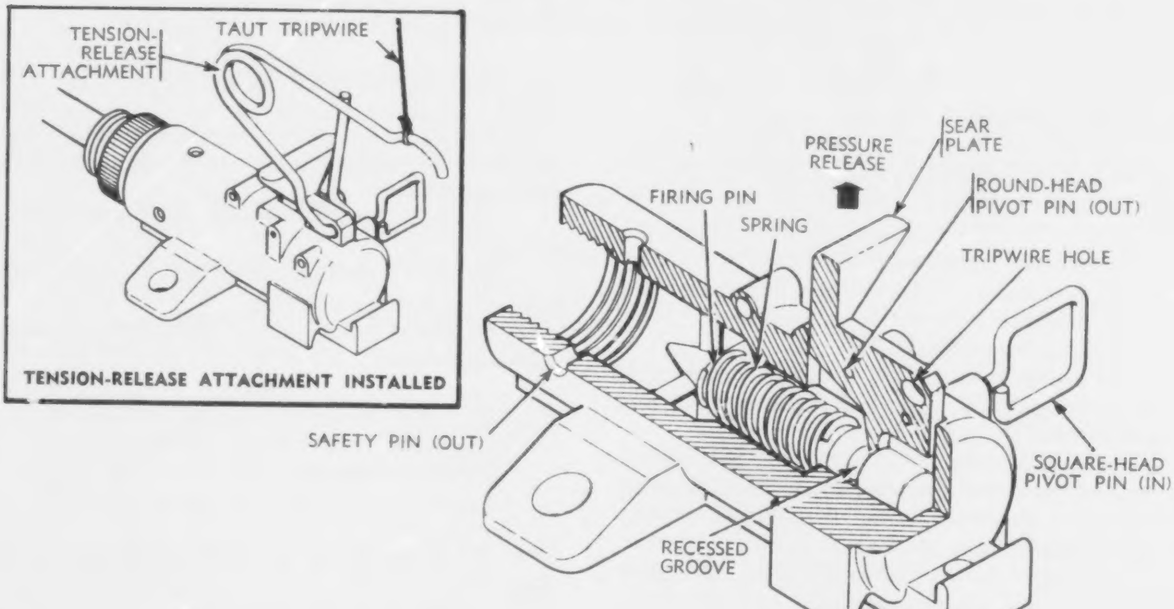

TENSION-RELEASE ATTACHMENT
TAUT TRIPWIRE
TENSION-RELEASE ATTACHMENT INSTALLED
PRESSURE RELEASE
SEAR PLATE
FIRING PIN
SPRING
ROUND-HEAD PIVOT PIN (OUT)
TRIPWIRE HOLE
SAFETY PIN (OUT)
SQUARE-HEAD PIVOT PIN (IN)
RECESSED GROOVE
AR 102155

Figure 2-42. Switch set for pressure release or tension release action.

must be at least two lbs so as not to activate the switch until it is released.

(*g*) Place (pressure) release plate to rest on Sear Plate. This should make the round-head pin easy to move, DO NOT REMOVE IT.

WARNING

If safety pin resists movement *do not* withdraw. Firing pin may have been released. Recheck assembly. Disassemble and reset if necessary (*e*(2) below)

(*h*) Assure safety pin is in place, but can be easily be removed. *Do not remove safety pin.* Remove round-head pin. Again check safety pin to assure firing pin was not released.

WARNING

All personnel but the prime installer (operator) should be evacuated from the area prior tc pulling the safety pin.

(*i*) Using a lanyard (length of wire or cord) to remove safety pin, take cover and pull the safety pin. Leave the area.

(4) *Tension release* (fig. 2-43). In this mode of

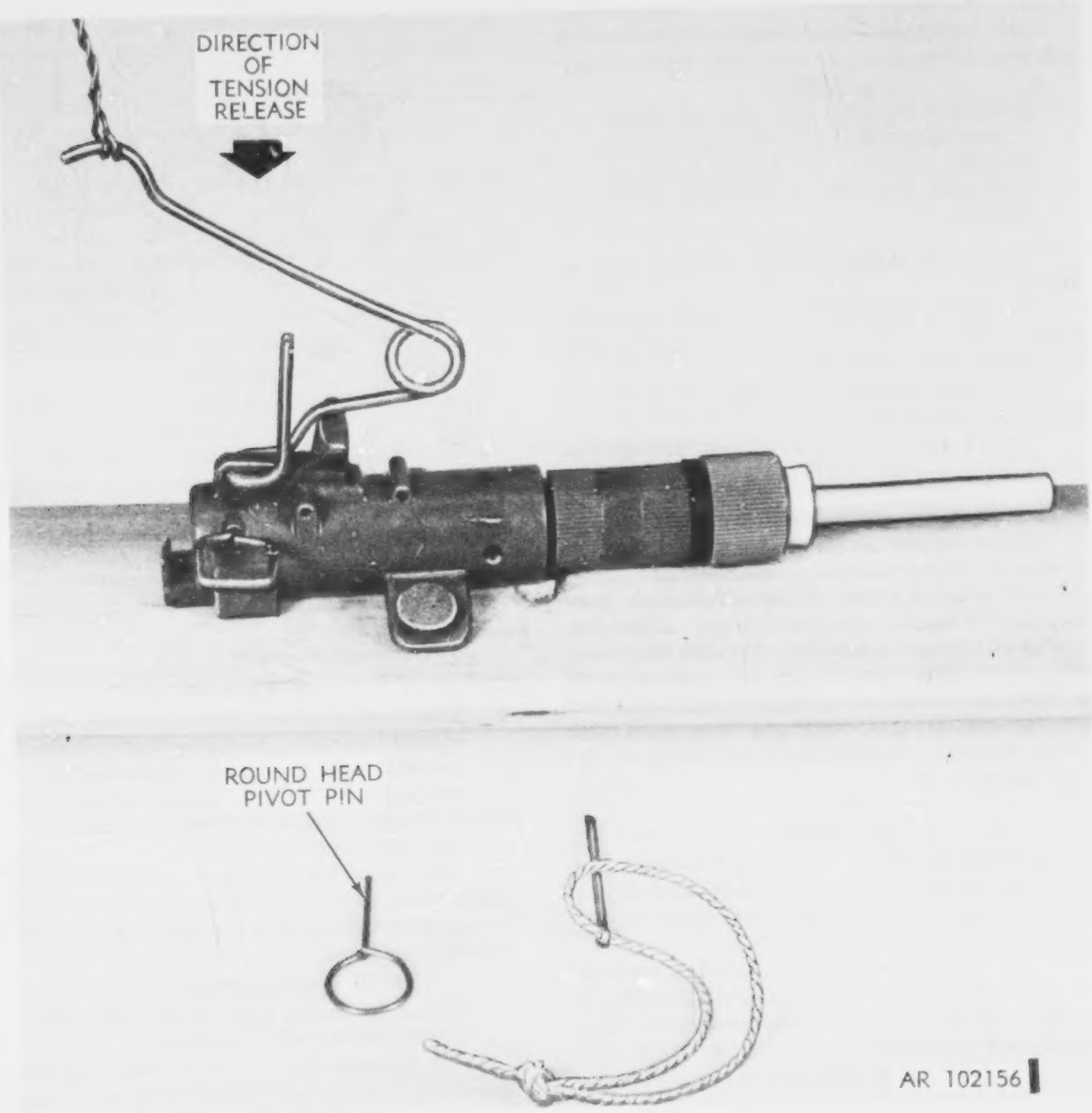


Figure 2-43. Position of firing device when set for tension release.

operation (fig. 2-42), the firing device functions when the tension of the tripwire is relieved when the tripwire is cut. Setting instructions are as follows:

(*a*) Assure both round and squarehead pivot pins are in place. Check components to assure there are no obvious defects. Check safety pin for ease of removal. Assure legs of safety pin are straight. If legs are bent, straighten and press them together with pliers.

(*b*) Secure switch to a fixed object with nails or screws.

(*c*) Secure blasting cap or time fuze into coupling body as desired (*c* above).

(*d*) Assure safety pin is in place. Screw coupling body into switch.

NOTE

> Removal of the safety pin is the final step in all operating modes. If the safety pin is inadvertently removed prior to step *i*, stop all procedures and refer to disarming procedures (*e*).

(*e*) Attach charge, etc. to coupling body as desired.

(*f*) Layout tripwire. Direction should be perpendicular to the longitudinal axis of the switch (i.e., pulling up with respect to switch).

(*g*) Secure one end of tripwire to a tree, stake or some other stationary object.

(*h*) Fit tension release attachment through tripwire hole (fig. 2-44) in sear plate.

WARNING

> Assure tripwire is taut enough so as not to accidently activate firing device.

(*i*) Loop other end of tripwire through goose neck arm of tension release attachment. Adjust tension so that the goose neck arm of the tension release attachment meets point X (fig. 2-44) and secure by twisting the free end of the tripwire around the taut tripwire and the goose neck arm with pliers. This should make the round-head pin easy to move. DO NOT REMOVE IT.

WARNING

> If safety pin resists movement *do not* withdraw. Firing pin may have been released recheck assembly. Disassemble and reset as necessary *e*(2).

(*j*) Assure safety pin is in place, but can easily be removed, DO NOT REMOVE SAFETY PIN. Remove round-head pin. Again check safety pin to assure firing pin was not released.

WARNING

> All personnel but the prime installer (operator) should be evacuated from the area prior to pulling the safety pin.

(*k*) Using a lanyard (length of wire or cord) to remove safety pin, take cover and pull the safety pin. Leave the area.

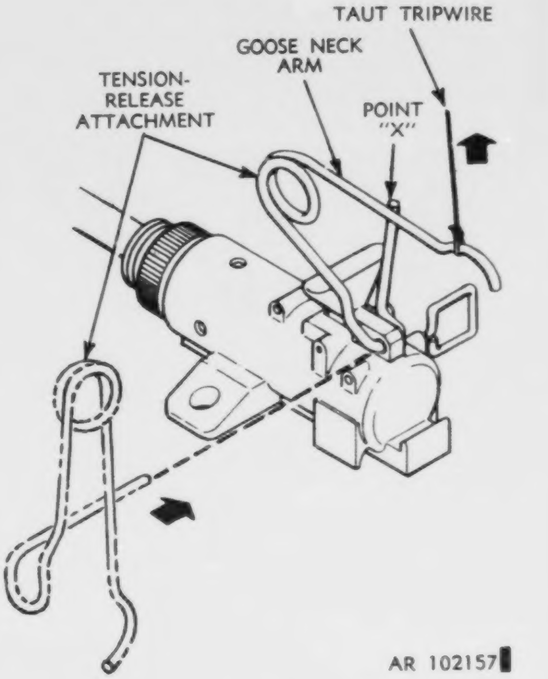


Figure 2-44. Installing tension release attachment.

e. Disarming Procedure, Resetting Procedure and Disposition of Material.

(1) *Disarming procedure.*

WARNING

> Disarming an armed firing device is considered hazardous. All unnecessary personnel must leave the danger area during disarming procedure. If in doubt as to condition of firing device, leave danger area and obtain EOD personnel assistance.

The following is for disarming a firing device which has not been actuated. If a device has been actuated or is suspected to have been actuated, refer to misfire procedure (*f* below).

WARNING

> Do not disturb the firing device when performing the following procedure.

(*a*) If a *time blasting fuse* is being used, and is accessible, carefully cut the fuse being certain not to disturb the firing device. Move the cut end of the fuse that is attached to the demolition charge, away from the cut end that is attached to the firing device.

WARNING

FIRING DEVICE WITH A CONNECTED CHARGE.

If the safety pin cannot be inserted into switch, firing pin has released and item has misfired. Leave danger area and obtain EOD personnel assistance (*f* below).

(*b*) Check safety pin, legs of safety pin should be straight. If legs are bent, straighten and press them together with pliers.

(*c*) Carefully insert the safety pin into firing device. After insertion, spread legs of safety pin just enough to prevent accidental loss of the safety pin during handling.

NOTE

If a safety pin is not available a piece of stiff steel wire or nail may be used.

(*d*) If possible reinsert the pivot pin that has been removed.

(*e*) Disconnect tripwire or restraining load, depending upon operating mode. Set tripwire aside for reuse or repacking.

(*f*) Remove mine or charge (depending upon mode of operation) from firing device.

WARNING

DO NOT ATTEMPT to remove a blasting cap from a coupling base.

(*g*) Unscrew coupling body or base from switch. Set coupling base aside.

(*h*) If coupling body has been used, unscrew packing nut remove rubber gasket and pull out blasting cap.

1. Reassemble coupling body (packing nut and rubber gasket).

2. Set blasting cap aside, separately and away from other explosives.

3. Set coupling body aside.

(*i*) Unfasten switch from its mounting (depending upon mode of operation).

(*j*) Collect all components of firing device.

(2) *Resetting procedure.*

(*a*) An actuated firing device with a coupling body containing a fired primer may be reset for training use, if it has not been damaged.

NOTE

The primer used in the coupling body provided with the M142 firing device is not issued separately, coupling body therefore is not reuseable. A standard coupling base must be used after the initial use of the coupling body.

(*b*) To reset a functioned firing device:

1. Clean exterior of switch and assure both pivot pins and safety pin are present, clean and straight. Straighten pins with pliers if necessary.

2. Unscrew and discard used coupling body. Assure firing pin and spring do not escape when coupling body is removed.

3. Disassemble sear plate by removing pivot pin(s). Clean all parts of the firing device and obtain a coupling base with a live primer.

4. Obtain an unsharpened pencil with an eraser or an object with a similar diameter.

NOTE

The following can be done by one person but it is easier if done by two.

5. Place all parts of the switch on a sturdy work surface.

6. Insert spring into open end of switch. Insert firing pin, long end with groove first, into spring.

WARNING

Letting go of the sear plate and/or pencil before firing pin is secured can result in a forceful release of the pencil and firing pin from the switch body. Watch your fingers—the device contains a very strong spring.

7. Hold switch body firmly on work surface in a manner that permits access to open end and sear plate slot. Force firing pin back into cocked position using the pencil. Insert and hold sear plate, line up pivot holes, assure sear plate locks into groove of firing pin. Insert both pivot pins into switch and sear plate in original manner. Do not let go of sear plate until both pins are in place (fig. 2-45).

NOTE

The round-head pivot pin and the square-head pivot pin have different diameters and are not interchangeable.

8. Insert safety pin into switch in original manner, spread its legs slightly so it cannot fall out by accident.

9. Clean and repack firing device in as close a manner to the original as practicable. It will be difficult to roll up the tripwire in original form. Roll up tripwire on reel if possible and tape down free end.

10. Check to assure all the pieces are in container.

NOTE

Locally obtained screws and nails may be used to replace originals if necessary, make sure nail and screw heads are big enough to properly secure firing device.

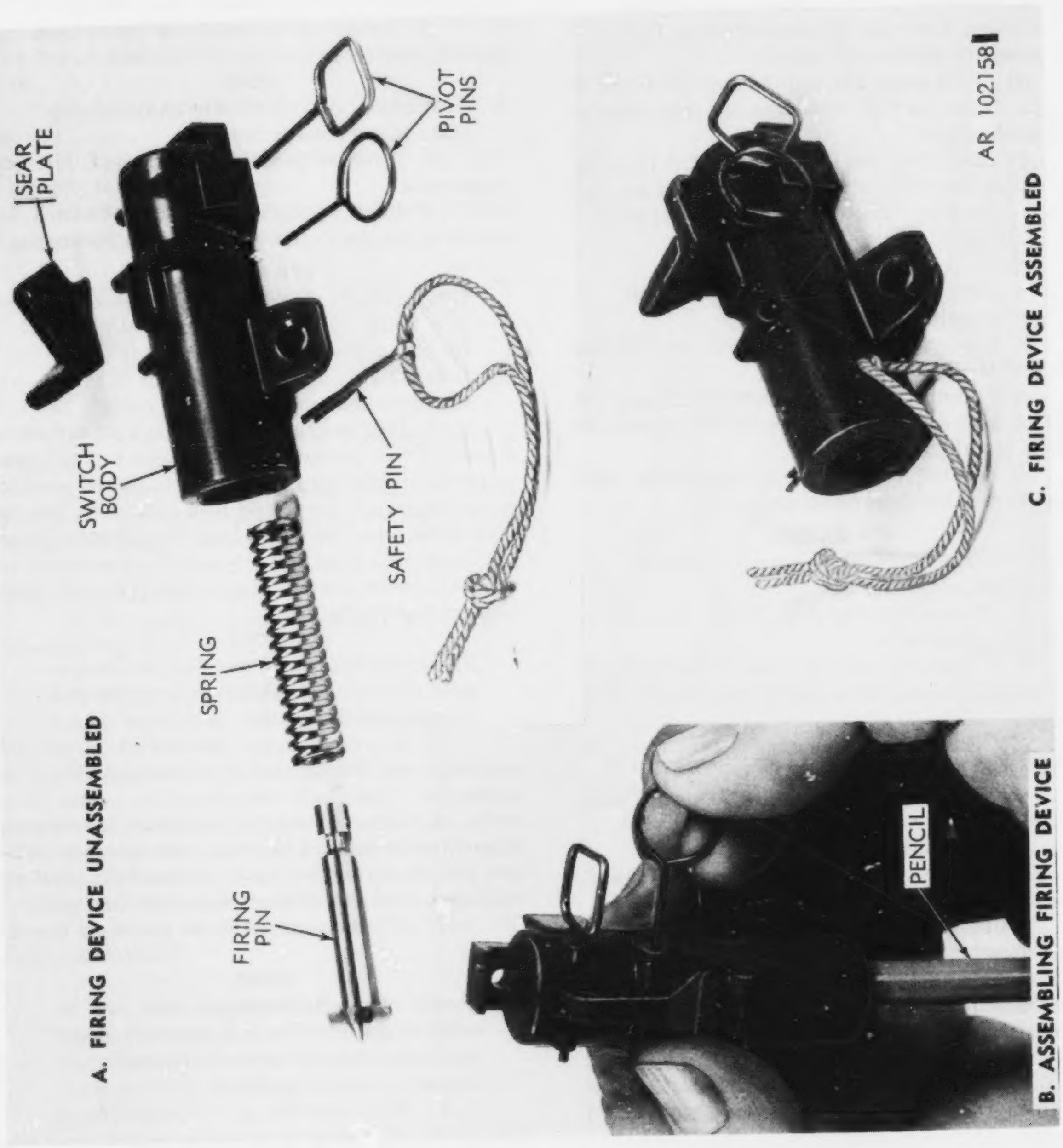
11. Mark container as a training item.

(3) *Disposition of material and repacking of disarmed firing devices.*

(*a*) Inspect firing device to determine its condition. If it is unserviceable, dispose of the firing device in accordance with local disposition procedures.

(*b*) If firing device is considered to be in good, functional condition (primer has not been fired).

1. Clean all components.


A. FIRING DEVICE UNASSEMBLED

B. ASSEMBLING FIRING DEVICE

C. FIRING DEVICE ASSEMBLED

Figure 2-45. Resetting procedures.

2. Straighten pivot pin(s) if necessary.

3. If necessary, reset switch (para 2-28.1(2)).

4. If a coupling base was used, obtain a replacement if necessary (see note). Coupling body may be reused.

NOTE

If a coupling base was used, a blasting cap is crimped onto it. This assembly must not be stored with the rest of the firing device or with any other type of explosives. If the firing device is to be quickly reused with a coupling base and blasting cap the assembly may be retained (though stored safely away from other explosive items). If quick reuse of the coupling base-blasting cap assembly is not anticipated, it should be destroyed. Moisture can enter blasting cap through the imperfect seal created with coupling base by crimping and cause a misfire on reuse.

5. Store blasting cap removed from coupling body with other blasting caps if reuse with firing device is anticipated. Use with coupling body will squeeze flare on open end of cap and may make use with time blasting fuse difficult. Therefore it may be locally destroyed if it is not to be reused with firing device.

6. Assure all firing device components are present. Roll up tripwire on tests reel and tape down the free end. Repack firing device in original manner.

f. Misfire Procedure.

WARNING

Misfired firing devices are extremely dangerous because the device's firing pin or pressure or release plate could be jammed and could release at the least disturbance.

(1) In view of the above, the safest thing to do with a misfired M142 device with an attached charge is to place another primed charge next to the device's charge and fire it to destroy the installation.

WARNING

Do not disturb the firing device when performing the following procedure.

(2) If a *time blasting fuse* is being used, and is accessible, carefully cut the fuse being certain not to disturb the firing device. Move the cut end of the fuse that is attached to the demolition charge, away from the cut end that is attached to the firing device. Deprime charge and remove. The firing device may now be safely disassembled since only the fuse will be lit if it is accidentally activated.

(3) Beyond the above, misfires of M142 firing devices should be tended to by qualified EOD personnel.

Section II. OPERATION UNDER UNUSUAL CONDITIONS

2-29. General

In addition to the operating procedures for usual conditions, special instructions for operation and storage under unusual conditions—extremes in temperature and weather condition—are to be observed when these conditions are present or anticipated.

Table 2-7. Operational Temperature Limits for Blasting Machines and Blasting Circuit Test Instruments

Item	Limits (degrees)	
	Lower	*Upper*
BLASTING MACHINES:		
Generator-type blasting machines	−40°F	+125°F
Blasting machines M32 and M34	−50°F	+125°F
BLASTING CIRCUIT TEST INSTRUMENTS:		
Blasting galvanometer with:		
a. Standard galvanometer battery	0°F	+125°F
(Recommended best-performance range)	(+32°F)	+110°F)
b. Special low temperature galvanometer battery	−20°F	*+35°F
Blasting cap test set M51	−40°F	+160°F

*This battery will operate to +35°F but should not be used in temperatures above 0°F unless necessary.

2-30. Extreme Climatic Conditions

a. Cold Weather (+32° to −65°F.).

WARNING

Static electricity is an increased hazard when operating in an extremely cold climate. Care must be taken to reduce the possibility of premature detonation of electric blasting caps.

In arctic operations, contamination with moisture is the source of many difficulties. Moisture can be the result of snow or ice getting into the material or box, condensation due to *breathing* of a partially filled container, or moisture condensed from warm air in a partially filled container when it is brought outdoors from room temperatures. Generally, extreme cold will crack insulation and cause electrical short circuits. Extreme cold will also cause waterproofing materials to become hard, brittle, and easily damaged or broken. The following procedures will be observed:

(1) Protect demolition materials from snow or ice.

(2) Do not open sealed boxes or packages until ready for use.

(3) Observe time delay versus temperature effects (table 2-5) for delay-type demolition firing device M1.

(4) Below −20°F. block demolition charge M3 (com C3) becomes brittle and cannot be molded to fit target.

(5) Adhesive-backed block demolition charges M112, M118, or M186 (roll) will not adhere to cold surfaces.

(6) In cold weather, all blasting machines should be exercised more than the usual four strokes before use, to free the mechanism. A drop of light machine oil should be applied to the plunger of the M32 or M34 before exercising the machine and whenever handle is sluggish. Even though the M32 and M34 will operate in extremely low temperatures, it is advisable that they be carried in a pocket inside the operator's outer clothing in extremely cold weather to make it easier to use (see table 2-7).

(7) In extremely cold weather, either type of blasting circuit test instrument must be carried in a pocket inside the operator's outer clothing unless it is a galvanometer equipped with a special, low temperature battery. If the temperature is anywhere near the lower limit assigned to the galvanometer with the low temperature battery, this practice is advised for it, too (see table 2-7).

(8) Under arctic conditions, blowing snow generations static electricity and is thus an additional hazard to electric blasting operations. Following the standard procedures of keeping caps shunted until connected to the firing wire, which itself is kept shorted at the blasting machine site, will not always offer sufficient protection from accidental initiation. The safest practice is to suspend electric blasting operations under cold, dry blowing snow (or dust) conditions. If it is absolutely necessary to undertake electric blasting operations under such conditions, a small amount of additional protection is obtained by keeping all wires on the ground at all times.

b. Hot Weather. Protect all demolition materials from sources of extreme high temperature, especially the direct rays of the sun. The temperature limit for storage of most demolition materials is +160°F. The nominal limit for operation is +140°F.

(1) Exposure to these high temperature limits degrade the shelf life of many items.

(2) These limits apply to the temperature of the item, not of the air. Temperatures in an unventilated container or building exposed to the sun may be much higher than the outside air temperature.

(3)

WARNING

Above 90°F, block demolition charge M3 emits gas which will cause sickening headaches.

Composition C3 used in block demolition charge M3 exudes oils and becomes buttery above 125°F.

(4) Prolonged exposure to high temperatures will have adverse long-range effects on blasting machines and blasting circuit test instruments, even though an immediate effect may not be apparent. Avoid storing or using this equipment where it will be exposed to elevated temperatures. With the galvanometer batteries, such exposure will have marked effect on their shelf life and useful life. When galvanometer is not to be used for extended periods, remove batteries and store batteries in refrigerated area.

c. Wet Weather. Keep demolition materials dry and free from mud and other foreign matter. Do not break moisture-resistant wrapper until material is to be used.

(1) Adhesive-backed block demolition charges M112, M118, or M186 (roll) will not adhere to wet surfaces.

(2) Nonelectric blasting caps are extremely sensitive to moisture. One drop of water entering the cap can cause a misfire. Every possible effort should be made to keep nonelectric caps dry. Keep them sealed in their boxes until ready for use.

(3) If a blasting machine gets wet, dry if off immediately. If a generator-type blasting machine has gotten wet internally, turn it in to organizational maintenance personnel immediately for disassembly, drying, and lubrication. The M32 and M34 are fully sealed and should not be damaged by a brief exposure to water, even immersion; but they should be dried off immediately.

(4) Whenever either of the blasting circuit test instrument is exposed to moisture, it should be wiped off immediately. If a galvanometer is immersed, it should be thoroughly dried externally and then the battery compartment should be opened to assure that no water has penetrated. If necessary, completely dry battery compartment. Disconnect battery and dry it, taking special care of connectors. Let battery sit out in air for an hour before resecuring it to allow it and compartment to thoroughly dry.

NOTE

Under extended conditions of high temperature and humidity storage, the adhesive on the urethane tape attached to the demolition charges M112, M118, and M186 can partially or completely lose its adhesive power. This does not affect the explosive characteristics of the charges. If the self-adhesive characteristic is required for a particular mission and charges are issued with inadequate adhesive tape, then use a suitable length of the double-sided adhesive tape, issued as part of both standard demolition equipment sets. If the lack of adhesion and use of fresh tape is inconvenient for the mission, exchange demolition charges with bad tape for charges with good tape. Request your supply element to report the situation on an Ammunition Condition Report (DA Form 2415). The demolition charges may continue to be issued but other users should be told about the tape so they may decide if the charges are acceptable for their particular mission.

d. Lightning. Lightning is a hazard to both electric and nonelectric blasting caps. A strike or a close miss is almost certain to initiate either type of cap. Lightning strikes, even at remote locations, may cause extremely high local earth currents and shock waves that may initiate electrical firing circuits. The effects of remote lightning strikes are multiplied by proximity to conducting elements, such as buildings, fences, railroads, bridges, streams, and underground cables or conduits. The only safe procedure is to suspend all blasting activities during electrical storms and before impending storms.

e. Blowing Dust or Sand. Static electricity is generated during dust and sand storms. Electric blasting operations should be discontinued when such storms are threatening or in progress.

(1) Keep cap wells, coupling bases, and nonelectric blasting caps free of dirt and sand. Such contamination can cause misfires.

(2) To prevent mechanical malfunction, protect firing devices from blowing dust or sand.

(3) All blasting machines should be protected from exposure to blowing dust and sand to avoid getting it into the gears. Even the well-sealed M32 and M34 should be given special care to avoid such exposure. Wrapping and sealing the machines in a plastic bag or a small tarpaulin is advised whenever such exposure may be encountered, whether in storage or in transport; even during transport to an operation.

(4) Though both the galvanometer and test set are quite well sealed against dust, dirt and sand, exposure to such blowing elements should be avoided. If a test set is exposed to blowing dirt or dust—and especially blowing sand—blow out the areas around the handle pivots by mouth or with compressed air before attempting to use the instrument.

2-31. Dual Priming Methods

a. Where high reliability is required in demolition operations dual priming is advised. Normally it is employed in multicharge operations to assure that all the charges fire. In extreme circumstances, it may be necessary to dual prime even a single charge.

b. When this is the case, it is essential that all steps are taken to assure that both primers on the blasting caps will be fully capable of initiating the charge.

c. Merely taping or tieing a second blasting cap to the side of a charge is not advised since this does not provide assurance of detonation, especially with less sensitive explosives. A secondary capwell can be formed in softer explosives (C4 or dynamite) using the pointed leg of a cap crimper. For TNT or tetrytol blocks, a second cap could be taped to the side of the block with a piece of FLEX-X (M118 or M186) explosive which is equipped with an adhesive tape on one surface, thus giving a ready-make tape-on priming charge. Refer to figure 2-29 and paragraph 2-19 to assure you use enough FLEX-X and properly position the cap.

d. Alternately, at least three wraps of detonating cord can be used as the priming charge; the detonating cord itself being initiated in a standard manner.

e. Because they must be initiated from a single point for proper effect, shaped charges cannot be directly dual primed. An almost equivalent assurance of initiation can be obtained by priming the shaped charge with a non-electric blasting cap on a piece of detonating cord and then affixing dual firing systems to the detonating cord. This method is also applicable to standard block charges.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

3-1. General

Upon receipt of demolition materiel, determine whether materiel is serviceable and verify items against requisition list.

3-2. Precautions

a. Unless packing boxes show evidence of moisture or damage to extent that contents may be unusable, do not open until demolition items are to be issued.

b. All standard precautions for care and handling of ammunition are applicable to demolition items. For specific precautions, refer to paragraphs 1-15 and 1-16.

3-3. Unpacking Procedures

a. If markings on box conflict with nomenclature of item requisitioned, check with ammunition supply personnel to determine if issue error has been made.

b. Inspect boxes for damage.

c. Return damaged boxes to ammunition supply personnel for disposition.

NOTE

For organizational maintenance, save some boxes for immediate reuse. Send remaining boxes to direct support. If boxes are needed and none are available, request boxes from direct support units.

d. Wood Boxes (fig. 3-1).

(1) Cut steel strapping with metal shears and remove. Dispose of metal straps.

(2) Cut off wire seals and discard.

(3) Twist swivel locks into proper position and open hasps.

(4) Lift box lid and remove top padding.

(5) Carefully lift out one barrier bag, taking care not to tear bag.

(6) Cut open barrier bag along the edge with most free area, cutting as close to sealed edge as possible.

(7) Remove item or items required and, if any are left in bag, immediately flatten open edge of bag to remove excess air. Fold over open edge of bag several times to provide remaining contents with some measure of moisture protection.

(8) Seal folded edge with any tape available to secure it in folded-over position.

(9) Repack in accordance with paragraph 3-4.

(10) Record number of items removed on appropriate inventory control forms in accordance with local regulations.

(11) Return partially filled box to storage area.

(12) Retain some packaging materials and empty boxes for return of unused materials or for replacement of broken boxes.

e. Wirebound Boxes (fig. 3-2).

(1) Cut off any wire seal and discard.

(2) Position box as shown in figure 3-2 and bend wire loops up to disengage them, using a Sallee closer (fig. 3-3), screwdriver, or pliers. Bend apart wire loops securing box and lift lid panel.

(3) Remove top layer(s) of packing.

(4) If possible, carefully lift out one barrier bag, taking care not to tear bag. It may be necessary to fold back another wirebound panel or two to remove contents of box.

(5) Cut open barrier bag along the edge with most free area, cutting as close to sealed edge as possible.

(6) Remove item or items required and, if any are left in bag, immediately flatten open edge of bag to remove excess air. Fold over open edge of bag several times to provide remaining contents with some measure of moisture protection.

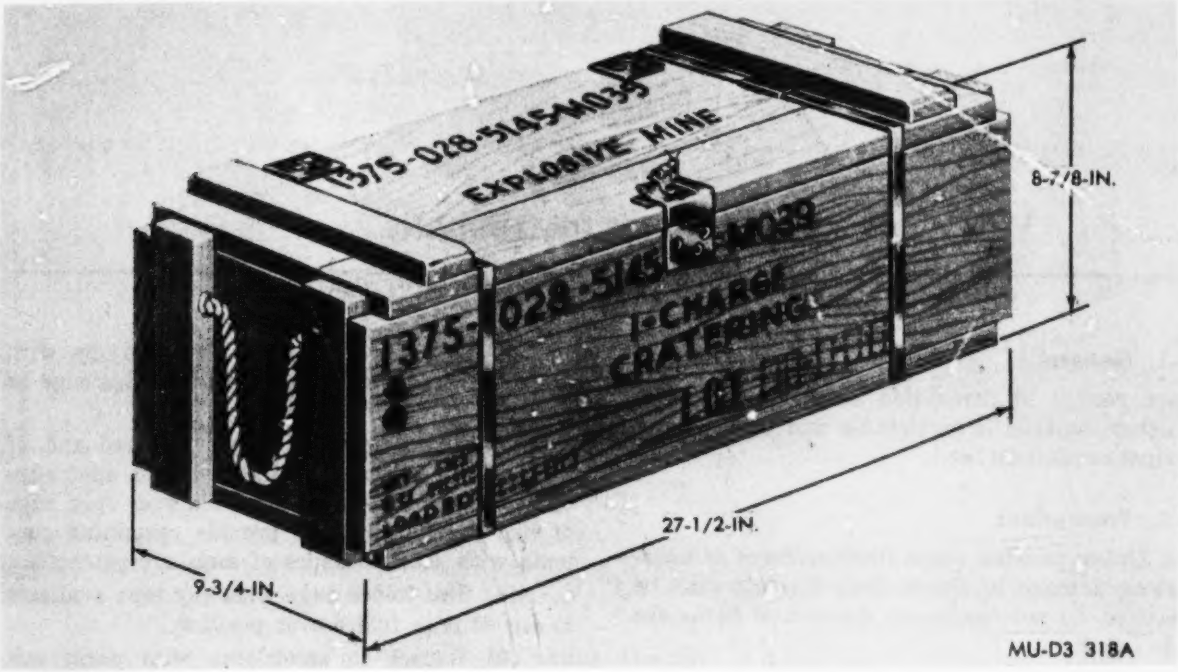
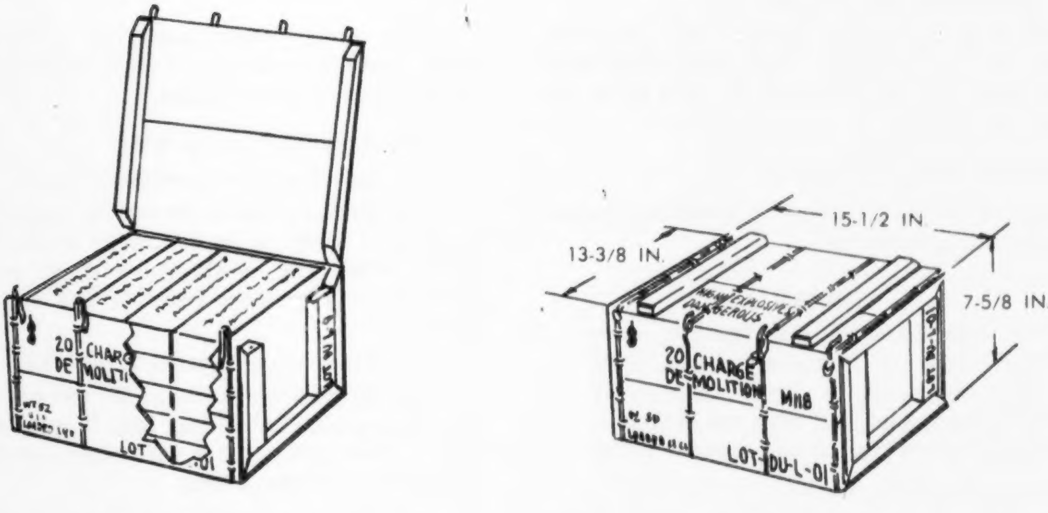


Figure 3-1. Typical wood packing box.



OPEN TO SHOW PACKING ARRANGEMENT

CLOSED AND SEALED

MU-D3 1606

Figure 3-2. Typical wirebound packing box.

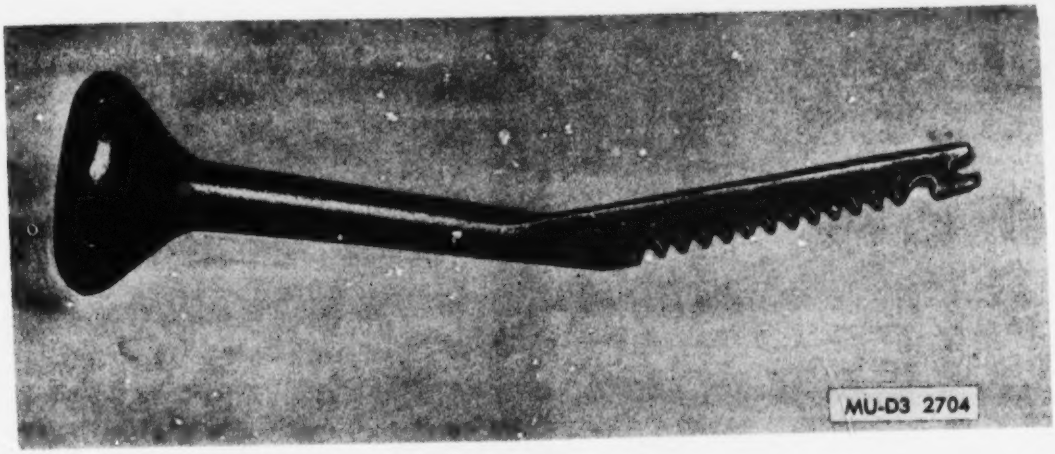


Figure 3-3. Sallee closer.

(7) Seal folded edge with any tape available to secure it in folded-over position.

(8) Repack in accordance with paragraph 3-4.

(9) Record number of items removed on appropriate inventory control forms in accordance with local regulations.

(10) Return partially filled box to storage area.

(11) Retain some packaging materials and empty boxes for return of unused materials or for replacement of broken boxes.

3-4. Repacking Procedures

a. General. Repacking will depend on the availability of packaging materials. Additional packaging materials will be obtained from direct support units. Table 3-4 contains the packing and marking data for standard packaging.

NOTE

Assure that the proper nomenclature and lot number for the item are marked on both the inner and outer package. Partially filled boxes also must be so identified (para 3-20).

b. Barrier Bag.

NOTE

Items that need to be repacked into barrier bags at organizational level will be given priority of issue.

(1) Inspect bag to check that it is intact, undamaged, and moisture-free.

(2) If inner box is used, repack completely with good items.

(3) Place item or inner box into bag in original manner, using creases in bag as a guide.

(4) Press and fold bag around contents to force out excess air.

(5) Fold over and tape open edge of bag to seal bag.

c. Wood Box.

(1) Verify that markings on inner pack and box agree.

(2) If necessary, re-mark box per paragraph 3-18 to agree with contents.

(3) Place inner pack(s) into box. Position items to balance the load for carrying.

(4) Use adequate filler material to assure a tight pack.

(5) Close the top.

(6) Close the hasp.

(7) Rotate hasp catch to the latch position.

(8) Secure hasp catch with a piece of lead seal wire if available; otherwise, use light wire.

(9) Mark light boxes (para 3-20).

d. Wirebound Box.

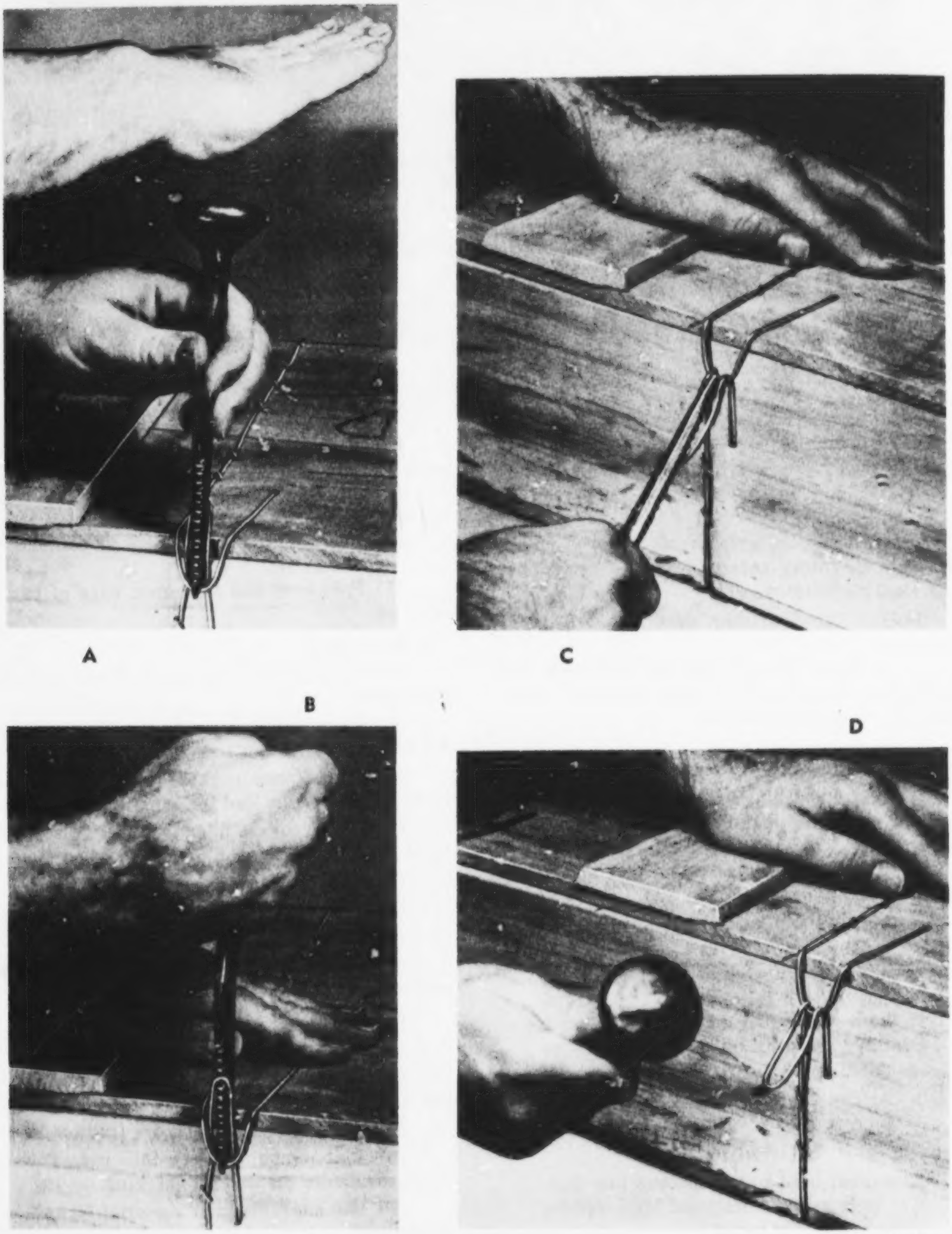
(1) Verify that markings on inner pack and box agree.

(2) If necessary, re-mark box (para 3-18).

(3) Place inner pack(s) into box. Position items to balance the load for carrying.

(4) Use adequate filler material to assure a tight pack.

(5) Close the top, being careful to assure that wire loops are fitted together.



MU-D3 2705

Figure 3-4. Procedure for closing wirebound box.

(6) When using Sallee closer, secure wire loops on boxes as follows:

(*a*) Insert closer to engage larger loop as shown in A, figure 3-4. Strike knob to bend down larger loop.

(*b*) Holding top panel down, re-insert closer (B, fig. 3-4), keeping teeth away from smaller loop until closer is pushed down as far as possible.

(*c*) While pushing closer down, swing it around to engage smaller loop in closer's teeth. Continue to swing closer around to bend smaller loop over larger loop as far as possible (C, fig. 3-4).

(*d*) Remove closer from loop and use knob to tab loop against the panel (D, fig. 3-4).

(*e*) Repeat until all wire loops are secure.

(7) Secure wire loops with a piece of lead seal wire if available; otherwise, use light wire.

(8) If Sallee closer is not available, use screwdriver and/or pliers.

(9) Mark light boxes (para 3-20).

3-5. Blasting Machines and Blasting Circuit Test Instruments

a. General. Whenever a new, used, or reconditioned blasting machine or blasting circuit test instrument is first received by using organization, it must be inspected and tested to assure equipment is in proper working order.

b. Blasting Machines.

(1) Inspect each machine for obvious external damage, such as crushed body, damaged handle, or severe corrosion. If such damage is present, forward machine to next higher maintenance level for corrective action.

(2) Clean exterior of each machine with soap and water if necessary. Keep water away from terminal and handle holes of machine.

(3) Put a few drops of light machine oil in handle hole of each 10-cap machine (except M32 and M34). To lubricate blasting machine M32 and M34 release handle by moving D-ring downward, and apply a drop of oil to plunger.

(4) Exercise blasting machines by actuating several times with nothing attached to terminals. Self-test M32 and the M34 by observing area between terminals after actuating several times. Indicator lamp should glow. If lamp does not glow, blasting machine is defective.

NOTE

If proper functioning of new blasting machine is critical to successful completion of blasting operations, it should be tested as specified below prior to starting operations.

(5) Connect a series circuit of electric blasting caps (para 2-4) equal to the rated capacity of the blasting machine (i.e., 10-cap, 50-cap, etc.) to a 500-foot length of No. 18 AWG firing cable. Connect blasting machine and operate as specified in paragraph 2-4*l*.

NOTE

Remember the M32 is a 10-cap blasting machine and the M34 is a 50-cap blasting machine.

(*a*) If all blasting caps function, machine is developing full output.

(*b*) If all blasting caps do not function, machine has failed to generate full output. Replace fired caps in the circuit and attempt to fire again using a different operator. If all blasting caps again fail to fire, machine is defective and should be turned in for maintenance.

c. Blasting Circuit Test Instruments.

(1) *Blasting galvanometer.*

(*a*) Unpack galvanometer and wipe clean with soft, dry cloth.

(*b*) Remove screws from battery cover and carefully lift off cover and gasket. Take care not to damage gasket.

(*c*) Connect galvanometer lugs to battery and, using pliers, secure battery screws in place. Assure that red galvanometer wire is connected to battery lead wire indicated by a plus (+) sign.

(*d*) Short galvanometer terminals with pliers or other piece of metal and observe meter. A maximum deflection of the needle (reading of 25) should be observed.

(*e*) Remove short and observe meter. Needle should return to zero.

(*f*) If meter responds properly in (*d*) and (*e*) above, place battery in battery compartment, assuring that cardboard insulator is properly placed, and that contact end of battery is in insulated end of compartment. Position gasket over battery compartment so that its larger (closed) area is over contact end of battery. Resecure battery cover with screws. Meter is ready for use.

(*g*) If meter does not respond properly in (*d*) and (*e*) above, clean battery contacts, tighten battery connections, and repeat (*d*) and (*e*).

(*h*) If meter still does not respond properly, replace battery in accordance with (*b*) and (*c*) above, and repeat (*d*) and (*e*) above.

(*i*) If meter still does not respond properly, organizational maintenance personnel should dispose of galvanometer in accordance with local material accounting procedures.

(2) *Test set M51.*

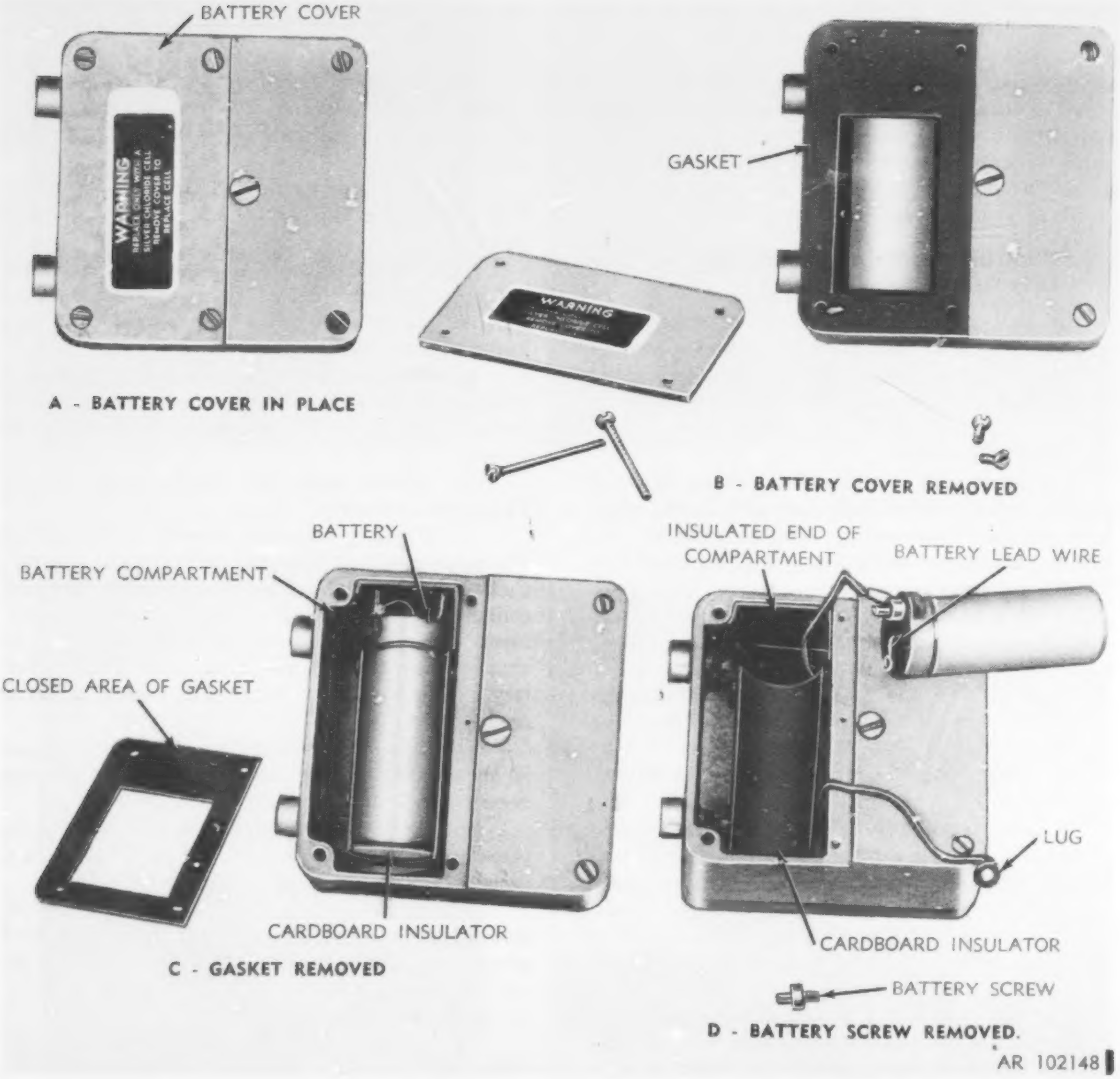
(*a*) Unpack test set and wipe clean with soft, dry cloth.

(*b*) Short machine's terminals with a piece of wire or a straightened paper clip, observe indicator lamp, and squeeze handle sharply. Lamp should light.

(*c*) Remove short, observe indicator lamp, and squeeze handle. Lamp should not light.

(*d*) If lamp responds properly in (*b*) and (*c*) above, test set is ready for use.

(*e*) If lamp does not respond properly in (*b*) and (*c*) above, organizational maintenance personnel should dispose of test set in accordance with local materiel accounting procedures.



A - BATTERY COVER IN PLACE

B - BATTERY COVER REMOVED

C - GASKET REMOVED

D - BATTERY SCREW REMOVED.

Figure 3-5. Replacing galvanometer battery.

Section II. TOOLS AND EQUIPMENT

3-6. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to demolition materiel are authorized for issue by tables of organization and equipment (TOE).

3-7. Special Tools and Equipment

Special Tools and equipment required at organizational level are listed in appendix D.

Section III. OPERATOR MAINTENANCE

3-8. General

Maintenance at the operator level consists mainly of preventive maintenance. Before deployment, inspect demolition items for defects that could cause materiel not to function as designed (i.e., exuding explosive charges, missing standoff, water-soaked blasting fuze, etc.)

3-9. Inspection

a.

WARNING

When inspecting delay firing device M1, do not touch any liquid leaking from ampoule. This liquid is corrosive.

Inspect demolition materiel (table 3-1) for defects listed. Defective items will not be used and will be turned in to authorized disposal personnel.

b. Lightly rusted or corroded shaped charges or items with metal components are serviceable and safe to use. Rust or corrosion should be removed at organizational level if item is not to be used at once.

3-10. Cleaning/Preservation

a. Clean items that have dirt, mud, grease, or sand by wiping with clean, dry cloth or other nonabrasive material.

b. Wipe off light rust, which can be removed from metal components with clean, dry cloth.

3-11. Adjustment of Firing Device Safety Pins

Inspect safety pins for security. Adjust by spreading legs of cotter pin(s).

Table 3-1. Defective Materiel—Operator Level

Item	Defect
Explosive charges (general)	1. Exuding 2. Badly crushed and crumbled
Explosive charges (specific): 40-lb cratering charge	Case rusted w/penetration
15-lb shaped charges M2A3 and M2A4	1. Broken or cracked glass cone 2. Missing standoff
40-lb shaped charges M3 and M3A1	1. Large dents in cone 2. Badly dented or broken body 3. Missing standoff
Time blasting fuze	1. Numerous cuts and gashes 2. Water soaked
Detonating cord	Numerous cuts and gashes
Delay firing device M1	1. Released firing pin 2. Cracked open or crushed 3. Leaking liquid from ampoule
Firing devices (except delay M1)	1. Crushed or dented body 2. Extreme corrosion
Fuse igniters	Cracked or crushed bodies
Delay detonators	1. Cracked or crushed blasting cap 2. Crushed or cracked bodies
Blasting caps	1. Moisture in package w/caps 2. Crushed or cracked bodies 3. Corrosion

Section IV. ORGANIZATIONAL MAINTENANCE

3-12. General

Organizational maintenance is performed by designated personnel in using units and is primarily preventive in nature. It is performed to prevent deterioration of demolition materials due to rough handling or exposure to adverse weather conditions. Direct support units may be called upon to provide technical advice, assistance, packing materials, and expendable supplies for accomplishing maintenance. Responsibilities of maintenance are limited to only those functions listed in Appendix C, Maintenance Allocation Chart.

3-13. Consumable Materials

a. Paint, cleaning compounds, and other consumable materials authorized for use by organizational maintenance personnel are listed in table 3-2.

b. Consumable materials should be requisitioned through normal supply channels on an as-required basis.

Table 3-2. Consumable Materials

(1) National Stock No.	(2) Description	(3) Specification No.	(4) Unit of Issue
6810-00-184-4796	Acetone, technical: 5 gal	O-A-51	cn
6810-00-205-6786	Alcohol, denatured	O-E-760	qt
8020-00-246-8504	Brush, artists: round flat edge	H-B-118	ea
8020-00-597-4768	laquering: 7/8 in. x 1 in	H-B-351	ea
8020-00-245-4522	paint: flat, w/square edge, 2½ in. x 1½ in	H-B-391	ea
8020-00-262-9084	varnish: ½ in. x 1 ¼ in	H-B-391	ea
6850-00-174-9672	Corrosion Removing Compound: wipe-off, type II, gal	MIL-C-10578	bt
7930-00-249-8036	Detergent, general purpose: 5 lb	P-D-220	bx
8010-00-935-7156	Enamel: blue, lusterless, no. 35109, pressurized can	TT-E-516	pt
8010-00-297-2119	blue, lusterless, no. 35109	TT-E-516	gl
8010-00-848-9272	olive drab, lusterless no. 34087 pressurized can	TT-E-516	pt
8010-00-297-2116	olive drab, lusterless no. 34087	TT-E-516	gl
5315-00-597-9766	Fastener, corrugated, wood joint: saw edge, ½ in	FF-F-133	hd
9150-00-190-0904	Grease: automotive and arty, 1 lb can	MIL-G-10924	cn
8520-00-782-3509	Hand, cleaner: type I, class 2 paste, grade A	P-H-031	gl
8010-00-584-3148	Lacquer: orange internaltional, color 12197	TT-L-50	pt
8010-00-721-9479	orange, color 12215	TT-L-50	pt
8010-00-161-7392	lusterless, sand no. 30277	TT-L-40	gl
9150-00-273-2389	Lubricating Oil: general purpose: sp, preservative, 4 oz	MIL-C-644	cn
7520-00-973-1059	Marker, tube type: black	GG-M-114	ea
5315-00-889-2745	Nail, box: style 4, type II, 8d, 2½ in	FF-N-105	bx
5315-00-889-2743	Nail, box: general purpose, style 4, type II 4d, 1½ in	FF-N-105	pg
5315-00-889-2744	Nail, box: general purpose, style 4, type II, 6d, 2 in	FF-N-105	pg
8030-00-244-1033	Neats-Foot Oil: 25 deg F pour pt, 1 gal	FED-G200	cn
5350-00-271-7935	Paper, abrasive, flint: gr 2/0, class I 100 sh	P-P-105	pg
8030-00-852-8013	Primer: rust arresting coating	TT-C-530	gl
8010-00-314-1861	coating: zinc-chromate, pressurized can for metal--yellow	TT-P-600	pt
7920-00-205-1711	Rag, wiping: cotton, unbleached, mixture	DDD-R-30	be
5340-00-598-3442	Seal, antipilferage: lead	MS-51938-2	hd
8135-00-281-4071	Strapping, steel: 5/8 in	QQ-S-781	cl
8135-00-283-0671	Strapping, steel: 1¼ in	QQ-S-781	cl
8135-00-266-6715	Tape, pressure sensitive adhesive: 2 in. clear, 60 in. lg	PP-T-60	rl
8010-00-087-1953	Thinner: synthetic	TT-T-306	qt
5350-00-255-7736	Wool, metallic: copper	FF-W-185	lb
5350-00-242-4405	steel	FF-S-740	lb

3-14. Unpacking

a. Unpack demolition materiel as required in paragraph 3-3.

b. During unpacking, inspect item for torn or unsealed barrier bags, presence of wet contents, deterioration, or damaged contents, as required in paragraph 3-15.

3-15. Inspection

a. Inspection at organizational level consists of a visual check for serviceability and defects. Table 3-3 lists defects and provides dispostion instructions.

b. Inspect demolition materials as follows:

(1) Inspect outer package visually for evidence of damage, moisture, and vermin infestation. If any of the above is found, open package and examine and dispose of contents in accordance with table 3-3.

Table 3-3. Disposition of Damaged Items—Organizational Level

Type of item	Condition	Quantity	Disposition
Explosive charges (general)	1. Exuding	*	1. Destroy—handle carefully
	2. Badly crushed and crumbled	*	2. Destroy
	3. Slightly crushed, dented (no crumbling)	*	3. OK to issue
	4. Water soaked	*	4. Allow to dry. If not crumbled, give priority of issue.
	5. Rusty cap wells	*	5. Give priority of issue
Explosive charges (specific): 40-lb cratering charge	1. Rusty case, no visible penetration	*	1. Examine carefully for penetration. If none, remove rust and paint. Give priority of issue.
	2. Rusty case, visible penetration	*	2. Destroy
15-lb shaped charges M2A3 and M2A4	1. Explosive powder leakage	*	1. Clean w/damp rag and give priority of issue for local use. DO NOT SHIP.
	2. Explosive powder leakage plus cracked or broken glass	*	2. Destroy
40-lb shaped charges M3 and M3A1 and bangalore torpedoes	1. Rusty case with only pinhole penetration	*	1. Remove rust, and repaint. Give priority of issue.
	2. Extensive penetration	*	2. If case is not significantly weakened and explosive not crumbling, use immediately. If item cannot be used within a reasonable time, destroy.
Time blasting fuse	1. Water soaked (long exposure)	*	1. Destroy
	2. Water dampened	*	2. Cut five feet off each end and destroy. Test remaining fuse and, if it burns properly, give it priority of issue.
	3. Gashed or cut	*	3. If a quantity of usable lengths of good fuse remain, cut off and destroy damaged portions. If not, destroy entire quantity.
Detonating cord	Water soaked, gashed or cut	*	If a quantity of usable lengths of good cord remains, cut off and destroy only the damaged portions. If not, destroy entire quantity.
Firing devices: Delay M1	1. Corroded bodies	*a.* Under 25	*a.* Destroy
		b. 25 or more	*b.* If slightly corroded, ship to DS for test. If extremely corroded, destroy.
	2. Reported long delays. (This is an effect of aging.)	*a.* Under 25	*a.* Destroy

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See footnote at end of table.

Table 3-3. Disposition of Damaged Items—Organizational Level—Continued

Type of item	Condition	Quantity	Disposition
Firing devices—Continued		*b.* 25 or more	*b.* Ship to DS for test. Annotate items if delay is less than 150 percent of nominal and give priority of issue. If over 150 percent of nominal, destroy.
Others (except M1)	1. Corroded bodies	*a.* Under 25	*a.* Destroy
		b. 25 or more	*b.* If slightly corroded, ship to DS for test. If extremely corroded, destroy.
	2. Bad primers	*a.* Under 25	*a.* Destroy
		b. 25 or more	*b.* Replace coupling bases or return to DS for same.
Delay detonators	1. Corroded bodies	*a.* Under 25	*a.* Destroy
		b. 25 or more	*b.* If slightly corroded, ship to DS for test. If extremely corroded, destroy.
	2. Caps broken off	*	2. Destroy
Blasting caps	1. Water soaked	*	1. Destroy
	2. Corrosion	*	2. Destroy

* Any number.

(2) Do not break open any moisture-proof pack, such as a barrier bag, unless there is firm evidence that pack has already been penetrated or that items within have been physically damaged.

c. If box markings are damaged or illegible, touch up or re-mark in adjacent blank area. If markings on box cannot be read, unpack box per paragraph 3-3, transfer markings from inner pack to box, and repack (para 3-4).

d. If lot number is legible but box is damaged beyond repair, repack contents in another box (para 3-4) and re-mark (para 3-18).

3-16. Cleaning and Spot Painting

a. Clean all items of dirt, mud, grease, and sand by wiping off with a clean, dry cloth. Take care not to disturb safety devices or spring-loaded mechanisms.

b. Wipe off light rust which can be removed from metal surfaces.

CAUTION

Do not paint firing devices, detonators, or fuse igniters since paint may cause malfunctioning. Use only paints listed in table 3-2 for retouching.

c. Retouch (spot paint) outer surfaces, using same color paint. Allow paint to dry.

d. Repack item in original manner (para 3-4), using only good packing materials. If the type of packing originally used is not available, improvise something similar. Make sure, however, that proper markings are printed on box (para 3-18), and box is tightly packed.

3-17. Evaluation and Repair of Packing Materials

a. General.

(1) Before attempting any work more extensive than simple remarking of a damaged box, remove contents.

(2) As a general policy, save one or two good boxes for each ammunition item normally in stock.

(3) When contents of a damaged box are transferred to another box, make sure that repacked box is marked to reflect exact contents, using wording on original box.

(4) Boxes that are not badly damaged should be repaired unless a supply of replacements is available.

(5) Dispose of surplus boxes, and any boxes or parts of boxes damaged beyond repair, in accordance with local regulations.

b. Wood Box.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Completely crushed.

(*b*) Badly dry rotted or fungus-covered inside and out.

(*c*) Insect infested.

(*d*) Severe warping, with items difficult to unpack and repack.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Hardware loose or missing—tighten loose hardware in place, or reposition in an adjacent area. Replace missing hardware with like items from an irreparable box.

(*b*) Slight dry rot, mildew, or fungus—clean with soap and water, wire brush, or sandpaper, as necessary, and re-mark.

(*c*) One or two boards badly damaged or warped—replace by cannibalization or fabrication.

(*d*) Nails loose or missing—renail, using next larger size nail, or renail in adjacent area.

(*e*) Water soaked—dry box, and examine for warping.

(*f*) Markings illegible—re-mark.

c. Wood Box—Hardware.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Heavily rusted.

(*b*) Inoperable hardware due to physical damage.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Lightly rusted—clean off rust, and repaint as required.

(*b*) Slight physical damage—repair as necessary.

d. Wood Box—Boards (and Skid Boards).

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Extensive physical damage.

(*b*) Cracks over ¼-inch between boards due to warping or other damage.

(*c*) Warping that prevents packing or closing box.

(*d*) Knots greater than one-fourth the width of board.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Splits over 3 inches long—Secure with corrugated fasteners.

(*b*) Splits at end of board—Secure board with nail on both sides of split. Use corrugated fastener if split is over 3 inches long.

(*c*) Surface damage leaving protruding splinters—Scrape or sand until smooth, and touch up painted boxes.

e. Wirebound Box.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Completely crushed or broken.

(*b*) Badly dry rotted or fungus-covered inside and out.

(*c*) Insect infested.

(*d*) Warping that prevents reassembly.

(2) *Reparable.* Repair items with slight dry rot or fungus by cleaning with soap and water, wire brush, or sandpaper as necessary, and re-mark.

f. Wirebound Box—Bound Panels.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Panel broken in more than one place.

(*b*) Panel extensively worn or punctured.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) A small break or split in panel—repair with staples and scrap pieces of wood.

(*b*) Markings illegible—re-mark.

(*c*) Surface damage leaving protruding splinters—scrape or sand until smooth, and touch up painted boxes.

g. Wirebound Box—End Panels.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Panel broken.

(*b*) Panel extensively worn or punctured.

(2) *Reparable.* Repair items with battens loose, broken, or missing by renailing or by obtaining replacements (cannibalize or fabricate). Replace whole panel from cannibalized stock if easier and if stocks permit.

h. Wirebound Box—Wire.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) One wire broken.

(*b*) Wire rusted through.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Slight rust—clean with sandpaper.

(*b*) Staples missing—replace.

i. Steel Strapping.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Cut or gash one-fourth the width of strapping.

(*b*) Very heavy rust.

(*c*) Seals damaged and loose.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Small cuts or scratches—touch up with paint to prevent rust.

(*b*) Slight rust—sand and touch up with paint.

(*c*) Loose seals—tighten strap and recrimp seal.

j. Cardboard Boxes.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) Wet through—cardboard delaminating.

(*b*) Extensive damage that impairs structure of box and prevents proper packing of items.

(*c*) Insect infested.

(*d*) More than a trace of mildew, fungus, or other disintegrating conditions.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Damp—remove and check contents. Dry box separately.

(*b*) Tape not adhering—retape.

(*c*) Loose or missing staples—restaple, or repair with tape.

(*d*) Slightly cut or gashed surface—apply tape over cut or gash.

(*e*) Slight surface mildew or fungus—wipe off, and allow box to dry if damp.

k. Barrier Bags.

(1) *Irreparable.* Replace or scrap items with the following conditions:

(*a*) *Moisture penetration.*

NOTE

Several affected bags must be opened to determine if moisture has penetrated.

(*b*) Mildew or fungus with moisture penetration.

(*c*) Disintegration or other penetrating damage.

(*d*) Delamination of bag material (more than just at corners; bag unsealed).

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Surface dampness—suspend bag and allow to dry on all sides.

(*b*) Slight surface mildew or fungus—wash with soap and water without damaging bag or item.

l. Metal Cans.

NOTE

Replacement cans are not available in supply system. Place opened can in barrier bag, and reseal (para 3-4).

(1) *Irreparable.* Scrap items with the following conditions:

(*a*) Heavy rust (entire can).

(*b*) Cuts or punctures.

(2) *Reparable.* For items with the following conditions, repair as specified:

(*a*) Light rust—sand and touch up.

(*b*) Peeling or chipping paint—touch up.

3-18. Re-marking Boxes

a. The following information must be legible on each box:

Information	*Example*
Nomenclature	Igniter, Time Blasting Fuse: M60, Weatherproof
Federal stock number (including DODIC)	FSN 1375-691-1671 M766
Lot number	Lot KXC 3-11
Date of manufacture	3-69
Quantity	300 each

b. If even *part* of the original markings are obliterated, apply new markings adjacent to original markings, using a waterproof ink marker or a china-marking pencil.

Table 3-4. Packing and Marking Data

Item	Packing container	No. items in box	No. items per inner pack	Total weight (lb)	Total explosive weight (lb)	Cube (ft)	Quantity-distance class	Storage compatibility group	Remarks
Demolition charges:									
Charge, demolition: block, M2	Wood box	16	8/haversack, 2 haversack/box	57	40	1.3	7	I	
Charge, demolition: block, M3	Wood box	16	8/haversack, 2 haversack/box	45	36	1.3	7	I	
Charge, demolition: block, M5A1	Wood box	24		80	60	1.6	7	I	
Charge, demolition: block, M112	Wirebound box	30		48	37.5	0.8	7	I	
Charge, demolition: block, M118	Wirebound box	20 sheets*		52	40	1.2	7	I	4 sheets equal 1 block
Charge, demolition: roll, M186	Wirebound box	3		115	75	3.8	7	I	
Charge, demolition: block, TNT:									
¼-pound	Wood box	200		79	50	1.7	7	I	
½-pound	Wood box	96		65	48	1.4	7	I	
1-pound	Wood box	48		80	48	1.4	7	I	
Charge, demolition: cratering, 40-pound	Wood box	1	1	52	40	1.2	7	I	
Charge, demolition: shaped, M2A3 and M2A4	Wood box	3	1/ctn, 3 ctn/box	65	34.5	1.3	7	I	
Charge, demolition: shaped, M3	Wood box	1		65	30	1.8	7	I	
Charge, demolition: shaped, M3A1	Wood box	1		65	30	1.8	7	I	
Charge assembly, demolition: M183	Wood box	16 blocks*	8/canvas bag, 2 bag/box	57	20	1.5	7	I	16 M112 blocks per assembly
Charge assembly, demolition: M37	Wood box	16 blocks*	8/canvas bag, 2 bag/box	57	20	1.5	7	I	16 M5A1 blocks per assembly
Demolition kit, bangalore torpedo: M1A1	Wood box	1		176	99	4.1	7	G	
Demolition kit, bangalore torpedo: M1A2	Wood box	1		198	115	4.1	2	G	
Dynamite, military, M1	Wood box	100	50/pkg, 2 pkg/box	80	43	1.6	7	I	
Time blasting fuse:									
Fuse, blasting, time: (safety fuse)	Wood box	80 coils*	2 coil/pkg, 5 pkg/mtl can, 8 can/box	93.5	Not specified**	3.7	1	B, E, N	50-ft coil
Fuse, blasting, time: M700	Wood box	80 coils*	2 coil/pkg, 5 pkg/mtl can, 8 can/box	64.5	Not specified**	7	1	B, E, N	50-ft coil

See footnote at end of table.

Table 3-4. *Packing and Marking Data*—Continued

Item	Packing container	No. items in box	No. items per inner pack	Total weight (lb)	Total explosive weight (lb)	Cube (ft)	Quantity-distance class	Storage compati-bility group	Remarks
Blasting caps: Cap, blasting: electric, J-2, type II	Wood box	500	C*		1.45		7	P	C = Commercial
Cap, blasting: electric, M6	Wood box	900	6/ctn, 1 ctn/wtrprf bag, 25 bag/fbrbd cntr, 5 cntr/box	114	2.62		7	P	
Cap, blasting: nonelectric, J-1	Wood box	5,000	50/can, 20 can/fbrbd cntr, 5 cntr/box		13.75	2.3	7	P	
Cap, blasting: nonelectric, M7	Wood box	3,600	6/ctn, 1 ctn/barrier bag, 50 bag/cntr, 12 cntr/box		9.92	3	7	P	
Detonators: Detonator, percussion: 15-second delay, M1A2	Wood box	200	10/ctn, 1 ctn/barrier bag, 5 bag/ctn, 4 ctn/box	75	1.8	2.3	7	P	
Detonator, percussion: 8-second delay, M2A1	Wood box	200	10/barrier bag, 5 bag/ctn, 4 ctn/box	62 62	1.6 1.6	4.1 4.1	7 7	P P	
Detonator kit, concussion: M1	Wood box	50	1/metal cntr, 50/cntr/box	59	0.2	2.4	3	B	
Explosive destructors: Destructor, explosive: universal, M10	Wood box	50	1/fbr cntr, 50 cntr/box	78	15.1	2.4	7	B	
Destructor, explosive: universal, M19	Wood box	6	1/fbr cntr, 6 cntr/box		2.73	0.8	7	P	
Time blasting fuse igniters: Igniter, time blasting fuse: friction, M1	Wood box	2,500	10/ctn, 250 ctn/box	62.5		3.37	1	B, E, N	
Igniter, time blasting fuse: weatherproof, M2	Wood box	150	5/ctn, 30 ctn/box	29	0.02		1	B, E, N	
Igniter, time blasting fuse: weatherproof, M60	Wood box	300	5/ctn, 60 ctn/box	56	0.02	2	1	B, E, N	
Cord, detonating	Wood box	4,000 ft	500 ft/can, 8/can wooden box	117	29	4	7	I	

Firing devices and components: Firing device, demolition: delay, M1.	Wirebound box	450	10/ctn, 1 ctn/bag, 15 bag/fbrbd cntr, 3 cntr/box	56	0.03	1.2	3	B	
Firing device, demolition: pressure, M1 and M1A1.	Wood box	250	5/box, 50 box/wdn box	80	0.014	2.1	1	B,E,N	
Firing device, demolition: pressure-release, M5.	Wood box	200	4/box, 5 box/fbrbd box, 10 fbrbd box/ wdn box	46.2	0.011	1.6	1	B,E,N	
Firing device, demolition: pull, M1.	Wood box	200	5/box, 1 box/foil envelope, 40 env/box	59	0.011	1.9	1	B,E,N	
Firing device, demolition: pull-release, M3.	Wood box	150	5/pkg, 30 pkg/ box	35	0.029	0.7	1	B,E,N	
Firing device, demolition: release, M1	Wood box	80	4/box, 20 box/wdn box	44	0.011	1.4	1	B,E,N	
Firing device, demolition: multipurpose: M142.	Wirebound wood box (WBWB)	56	14/metal box M19A1 4/WBWB	43	N/A	0.92	1	B,E,N	
Coupling base, firing device	Wood box	500	50/ctn, 10 ctn/ box	35	0.09	1.3	7	P	
Primer, percussion: cap, M2 and improved No. 3.	Wood box	5,000	100/ctn, 50 ctn/ box	24	0.29	0.9	3	B	
Demolition accessories and tools: Adapter, priming: explosive, M1A4.									
Adhesive, demolition charge: supplementary.									
Box, blasting cap: 10-cap or 50-cap capacity.									
Box, blasting cap: 10-cap capacity.									
Holder, blasting cap: M8									
Test set, blasting cap: M51									

*See Remarks Column.

**A continuous core of black powder is adjusted to meet burning time requirements.

3-19. Repriming Procedures

Reprime coupling bases for firing devices as follows:

WARNING

> Never attempt to remove an unfired or misfired primer from a coupling base.

NOTE

> Firing devices may be reused several times in training by replacing or repriming coupling bases.

a. Following is required:

(1) Clean, smooth work surface.

(2) Stiff wire or a strong, round stick about $\frac{1}{16}$-inch in diameter and two or three inches long. (A No. 2 paper clip will do.)

(3) Clean rag.

(4) Small pair of pliers.

(5) Knife.

(6) Small block of wood.

b. Remove fired coupling base from firing device.

c. Use pliers to remove any part of fired blasting cap still crimped to coupling base nipple.

d. Wire coupling base clean with rag.

e. If this is the first repriming of the coupling base, use knife to scrape glue from around primer flange.

f. Grasp coupling base gently with pliers around threads on primer side of flange, seating pliers against flange.

g. Insert wire or stick into nipple hole. Swing coupling base against something solid, so as to strike the stick or wire and knock the fired primer out of its hole.

NOTE

> Pushing will not usually dislodge primer, especially if base has not been previously reprimed. You have to hit the primer to knock it out.

h. Clean out hole through coupling base using stick or wire.

i. Insert new primer in coupling base.

j. Grasp coupling base nipple with pliers, and push primer end against wood block to seat primer. Make sure primer flange butts against coupling base body.

k. Repack.

3-20. Color Coding of Boxes with Light Loads

Boxes with less than full contents will be painted orange as follows:

a. Check contents with markings on box to verify that nomenclature and lot number are correct.

b. Make diagram of markings on box and record all markings except quantity figure.

c. Apply orange enamel to all outer surfaces of box. If enamel is not available, use orange lacquer.

d. When box is dry, re-mark box as diagramed (*b* above).

e. Count quantity of items in box and mark number on box in same position as the original quantity figure.

f. Print the words *LIGHT BOX* on each side of box, using approximately same size letters as original markings.

NOTE

> Using organizations will apply this procedure only when boxes with less than full contents will be returned to storage area or transported to new location. When painting of boxes is required, remarking (except quantity) may be avoided by applying masking tape on markings prior to painting box orange.

CHAPTER 4

SHIPMENT AND STORAGE

Section I. SHIPMENT

4-1. Precautions

Give demolition materials being transported adequate protection. Assure they will not be damaged, contaminated, or otherwise degraded so that they become dangerous or their usefulness impaired.

4-2. Instructions

a. Transportation.

(1) Block and brace demolition packages being transported in trucks, jeeps, and other tactical vehicles. (Blocking and bracing must be adequate to withstand sudden stops and starts, as well as offroad operations).

(2) If packing is broken or damaged and munitions remain serviceable, restore or replace packing by using acceptable packing material. Assure that all markings (e.g., lot number, nomenclature, FSN, etc.) are transferred to new packing material.

b. Handling.

WARNING

Avoid improper handling since reliability and safety of demolition materials may be affected, creating hazardous conditions.

(1) Retain demolition materials in their packing until issued.

(2) Do not roll, drop, throw, or subject boxes to rough handling.

4-3. Data

The following information appears on the outer pack:

Department of Transportation (DOT) shipping class and designation.

Federal stock number (FSN) and Department of Defense Identification Code (DODIC).

Ammunition lot number.

Gross weight of packing container and contents.

Cubical displacement of packing container.

Date manufactured.

Descriptive nomenclature of packed item.

Storage temperature limit (if nonstandard).

Section II. STORAGE

4-4. Precautions

a. Select level, well-drained sites free from readily ignitable and flammable materials.

b. Provide nonflammable or fire-resistant overhead covers (e.g., tarpaulin) for all items. Maintain overhead space of approximately 18 inches between cover and items. Keep cover at least 6 inches from pile on ends and at sides, to permit circulation of air.

c. Temporarily store unserviceable demolition materials in segregated area.

d. Temporarily store returned items from the using unit in segregated area, for inspection and repacking.

e. Regard suspended demolition items as unserviceable, unless otherwise instructed.

4-5. Data

a. Field Storage Categories

(1) *General.* Storage categories are the primary groups into which ammunition (including demolition materials) is segregated for storage in the field. Safety procedures covering storage are based on the following factors:

(*a*) Within each storage category, maximum quantity of items to be stored within each stack and within each Field Storage Unit (FSU), and minimum distance between FSU's and categories, are specified in quantity-distance table 4-1 for storage in the field.

(*b*) Normally, only one kind of demolition material is stored in a stack. Always keep initiating devices, such as blasting caps, separated from other high explosives of all types. Items should be arranged in stacks in the best manner to facilitate inventory and inspection. Where camouflage is a consideration, stacks may be stepped-in toward the top (terraced or pyramid stacking) to decrease shadows. Whenever desirable, components of complete rounds may be stored within the same FSU.

(2) *Field storage category for demolition materials.* All demolition explosives and components such as blasting caps, firing devices, detonating cord, and safety fuze are included in category E of field storage categories.

b. Quantity-Distance Tables for Field Storage Categories. Procedures set forth in table 4-1 are to be used as a guide in storage of demolition materials in the field only. These procedures are based upon necessities incidental to field storage. It must be emphasized that any reduction of distances, or increase in tonnages to those prescribed amounts, will increase the probability of loss of life and ammunition (see also TM 9-1300-206).

Table 4-1. Quantity-distance Table—Category E

Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded	Categories
Less than 5	50	75	60	300	900
5-10 max	50	105	75	300	900

c. Permanent Installation Storage. For permanent installation storage, standard quantity-distance classes and storage compatibility groups given in TM 9-1300-206 apply.

4-6. Procedures

a. Use heavy, well-supported dunnage to prevent stack from sinking, and to keep bottom tier off ground.

b. Use hardstand of gravel and sand rather than excessive dunnage.

c. Allow at least 6-inch clearance beneath pile for air circulation.

d. Dig suitable trenches to prevent water from flowing under pile.

APPENDIX A

REFERENCES

A-1. Publication Indexes

The following publication indexes should be consulted frequently for the latest changes or revisions of references given in this appendix and for new publication relating to the materiel covered in this manual:

Index of Administrative Publications	DA Pam 310-1
Index of Blank Forms	DA Pam 310-2
Index of Doctrinal, Training, and Organizational Publications	DA Pam 310-3
Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders	DA Pam 310-4
Index of Supply Catalogs and Supply Manuals (excluding types 7, 8, and 9)	DA Pam 310-6

A-2. Army Regulations

Reporting of Transportation Discrepancies in Shipments	AR 55-38
Transportation by Water of Explosives and Hazardous Cargo	AR 55-228
Military Traffic Management Regulation	AR 55-355
Malfunctions Involving Ammunition and Explosives	AR 75-1
Interservice Responsibilities for Explosive Ordnance Disposal	AR 75-14
Responsibilities and Procedures for Explosive Ordnance Disposal	AR 75-15
Administration	AR 210-10
Accident Reporting and Records	AR 385-40
Procedures for Firing Ammunition for Training, Target Practice, and Combat	AR 385-63
Identification of Inert Ammunition and Ammunition Components	AR 385-65
Reporting of Item Discrepancies Attributable to Shippers	AR 735-11-2

A-3. Blank Forms

Accident Report	DA Form 285
Individual Sick Slip	DD Form 689
Emergency Care Treatment	SF 558
Recommended Changes to Publications and Blank Forms	DA Form 2028
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Equipment Maintenance Log	DA Form 2409
Ammunition Condition Report	DA Form 2415
Fire Report	DA Form 3985
Report of Discrepancy	SF 364
Discrepancy in Shipment Report	SF 361
Quality Deficiency Report	SF 368

A-4. Doctrinal, and Organizational Publications

Field Manuals

Camouflage, Basic Principles and Field Camouflage	FM 5-20
Explosives and Demolitions	FM 5-25
Boobytraps (U)	(C) FM 5-31
Engineering Field Data	FM 5-34
Operation and Maintenance of Army Materiel in Extreme Cold Weather, 0 to −65°F	FM 9-207
Military Symbols	FM 21-30
Grenades and Pyrotechnics Signals	FM 23-30
Basic Cold Weather Manual	FM 31-70
Northern Operations	FM 31-71
Mountain Operations (How To Fight)	FM 90-6 (HTF)

A-5. Equipment Manuals

a. Technical Manuals.

Ammunition, General	TM 9-1300-200
Ammunition and Explosive Standards	TM 9-1300-206
Military Explosives	TM 9-1300-214
Demolition Materials	TM 9-1375-213-34
The Army Maintenance Management System (TAMMS)	TM 38-750
Destruction of Conventional Ammunition and Improved Conventional Munitions to Prevent Enemy Use	TM 750-244-5-1

b. Supply Bulletins.

Preservation Packaging, Packing, and Marking Supplies, and Equipment Used by the Army	SB 38-100
Department of Defense Ammunition Code	SB 708-33

c. Supply Catalogs.

Ammunition and Explosives: Classes 1340 thru 1398	SC 1340/98-IL
Demolition Equipment Set, Explosive Initiating, Electric and Nonelectric	SC 1375-95-CL-PO2

APPENDIX B

BASIC ISSUE ITEMS LIST

(Not applicable)

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

a. The Maintenance Allocation Chart designates responsibility for the performance of maintenance functions.

b. Only the lowest level of maintenance authorized to perform a maintenance function is indicated.

c. A maintenance function assigned a maintenance level will automatically be authorized to be performed at any higher maintenance level.

d. A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be evacuated to the next higher maintenance organization. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the appropriate commander.

C-2. Maintenance Functions

The implementation of maintenance tasks will be consistent with the assigned maintenance in accordance with the following definitions.

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition.

(*1*) *Unpack.* To remove item from packing box for service or when required for the performance of other maintenance operations.

(*2*) *Repack.* To return item to packing box after service and other maintenance operations.

(*3*) *Clean.* To rid the item of contamination.

(*4*) *Touch-up.* To spot paint scratched or blistered surfaces.

(*5*) *Mark.* To restore obliterated identification.

d. Install. To emplace, seat, or fix into position an item in a manner to allow the proper functioning of the equipment.

e. Adjust. To maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

f. Renovate. To restore item to serviceable condition.

(*1*) *Paint.* To repaint the entire item.

(*2*) *Repair.* To restore serviceability to an item by correcting specific damage, fault, malfunction, or failure through the application of maintenance services or other maintenance actions.

(*3*) *Replace.* To substitute a serviceable component in a manner to allow the proper functioning of equipment.

C-3. Explanation of Format

a. Group Number. Column 1 lists the group numbers, the purpose of which is to identify components and assemblies with the next higher assembly.

b. Functional Group. Column 2 lists the item names of parts and assemblies on which maintenance is authorized.

c. Maintenance Function. Column 3 lists the twelve maintenance functions defined in C-2 above. Capital letters are inserted under appropriate maintenance functions, on line with each functional group, to indicate the lowest level of maintenance authorized to perform that function. Symbols used and the maintenance category each represents are as follows:

Symbol	Explanation
C	Crew
O	Organizational
F	Direct Support
H	General Support
D	Depot

d. Tools and Equipment and Remarks. Column 4, Tools and Equipment, and Column 5, Remarks, list by use of footnotes those tools and test equipment required to perform the designated function, and any remarks about maintenance.

Section II. MAINTENANCE ALLOCATION CHART

(1)	(2)	(3)												(4)	(5)
		Maintenance function													
				Service							Renovate				
Group No.	Functional group	Inspect	Test	Unpack	Repack	Clean	Touch up	Mark	Install	Adjust	Paint	Repair	Replace	Tools and equipment	Remarks
	01–DEMOLITION CHARGES														
0101	CHARGE, DEMOLITION: BLOCK, ROLL, AND CARTRIDGE.														
	Charge, demolition: block TNT ¼-, ½-, 1-pound, block M3; block M5; block M112; block M118; roll M186; and dynamite: military, M1.														
	Charge, demolition	C	F	C	C	C	-	-	-	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0102	CHARGE, DEMOLITION: SHAPED AND CRATERING.														
	Charge, Demolition: shaped, M2A3, M2A4, M3, M3A1, Mk 74, Mod 0; and charge, demolition: 40-pound, cratering.														
	Charge, demolition	C	F	C	C	C	O	F	-	-	F	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0103	CHARGE ASSEMBLY, DEMOLITION:														
	Charge assembly, demolition: M183, M37.														
	Charge assembly	C	F	C	C	C	-	F	-	-	-	-	-		
	Priming assembly	C	F	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	02–EXPLOSIVE DEMOLITION ACCESSORIES														
0201	CAP, BLASTING														
	Cap, blasting: special, electric (type II, J-2 PETN) or M6.														
	Cap, blasting	C	C	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	Cap, blasting: special, non-electric (type I, J-1 PETN) or M7														
	Cap, blasting	C	F	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0202	CORD, DETONATING														
	Cord, detonating: fuse, primacord, 100-ft spool														
	Cord, detonating	C	F	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0203	DESTRUCTOR														
	Destructor, explosive: universal, M10.														
	Destructor, explosive	C	F	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	Destructor, explosive: M19														
	Destructor, explosive	C	F	C	C	C	O	F	-	-	F	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0204	DETONATOR														
	Detonator, percussion: M1A2, 15-second delay, and M2A1, 8-second delay.														
	Detonator, percussion	C	F	C	C	C	-	F	C	C	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0205	FIRING DEVICE														
	Firing device, demolition: delay-type, M1.														
	Firing device	C	F	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	Firing device, demolition: pressure-type: M1, M1A1.														
	Firing device	C	F	C	C	C	O	F	C	C	-	-	-		
	Tri-pronged pressure head and extension	C	-	C	C	C	O	-	C	-	-	-	-		
	Coupling base [1]	C	F	C	C	C	-	-	C	-	-	O	C		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		

See footnotes at end of chart.

Section II. MAINTENANCE ALLOCATION CHART—Continued

(1)	(2)	(3)												(4)	(5)
		Maintenance function													
				Service							Renovate				
Group No.	Functional group	Inspect	Test	Unpack	Repack	Clean	Touch up	Mark	Install	Adjust	Paint	Repair	Replace	Tools and equipment	Remarks
	Firing device, demolition: pressure-type, M5.														
	Firing device	C	F	C	C	C	-	-	C	C	-	-	-		
	Coupling base [1]	C	F	C	C	C	-	-	C	-	-	O	C		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	Firing device, demolition: M1, pull-type and M3, pull-release-type.														
	Firing device	C	F	C	C	C	-	F	C	C	-	-	-		
	Coupling base [1]	C	F	-	-	-	-	-	C	-	-	O	C		
	Anchor cord	C	-	-	-	-	-	-	C	C	-	-	O		
	Tripwire	C	-	C	C	-	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	Firing device, demolition: M1, release-type.														
	Firing device	C	F	C	C	C	-	-	C	C	-	-	-		
	Coupling base [1]	C	F	-	-	-	-	-	C	-	-	O	C		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	Firing device, demolition: multipurpose: M142.														
	Firing device	C	D	C	C	C	-	F*	C	C	-	-	-		*On container
	Coupling body [6]	C	D	C	C	C	-	-	-	C	-	-	C		
	Trip wire	C	-	C	C	-	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	C	O	O	-	-	-	O	O		
0206	FUSE														
	Fuse, blasting, time; safety or M700, 50-ft coil.														
	Fuse, blasting	C	C	C	C	-	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	O	O	O		
0207	IGNITER, TIME BLASTING FUSE														
	Igniter, time blasting fuse: M1, friction; M2 weatherproof; M60 weatherproof.														
	Igniter	C	F	C	C	C	-	-	C	C	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0208	PRIMER, PERCUSSION: CAP, M2 AND IMPROVED NO. 3.														
	Primer, percussion	C	F	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
	03—MISCELLANEOUS DEMOLITION ACCESSORIES (NONEXPLOSIVE)														
0301	ADAPTER, PRIMING: M7A4														
	Adapter, priming	C	-	C	C	C	-	-	C	-	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0302	ADHESIVE PASTE M1; AND ADHESIVE, SUPPLEMENTARY (TUBE)														
	Adhesive paste	C	-	C	C	C	C	C	-	-	-	-			
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0303	10-CAP GENERATOR-TYPE BLASTING MACHINES														
	Blasting machine	C	F	C	O	C	O	-	-	-	O	F	-		
	Case [2]	C	-	-	-	C	O	-	-	-	O	F	F		
	Strap, leather	-	-	-	-	C	-	-	-	-	-	-	F		
	Gasket, water-proof [2]	-	-	-	-	F	-	-	-	-	-	-	F		
	Packing, preformed; Oring [2]	-	-	-	-	F	-	-	-	-	-	-	F		
	Brush and spring [2]	-	-	-	-	F	-	-	-	-	-	F	F		
	Armature [2]	-	-	-	-	F	-	-	-	-	-	F	F		
	Gear group (including gear sector) [2]	-	-	-	-	F	-	-	-	-	-	-	F		

See footnotes at end of chart.

Section II. MAINTENANCE ALLOCATION CHART—Continued

(1)	(2)	(3)												(4)	(5)
		Maintenance function													
				Service							Renovate				
Group No.	Functional group	Inspect	Test	Unpack	Repack	Clean	Touch up	Mark	Install	Adjust	Paint	Repair	Replace	Tools and equipment	Remarks
	Gear sector and stud	-	-	-	-	F	-	-	-	-	-	-	F		
	Stator [1]	-	-	-	-	F	-	-	-	-	-	-	F		
	Small parts (headless straight pin, screws, & splice connector)	-	-	-	-	-	-	-	-	-	-	-	F		
0304	BLASTING MACHINE M32, M34														
	Blasting machine	C	F	C	O	C	-	-	-	-	-	-	-		
0305	PLUNGER-TYPE BLASTING MACHINES (30-, 50-, and 100-CAP)														
	Blasting machine	C	F	C	O	C	O	-	-	-	O	F	F		
	Case [2]	-	-	-	C	O		-	-	-	O	F	F		
	Panel [2]	-	-	-	-	F	-	-	-	-	-	-	F		
	Strap, leather [2]	-	-	-	-	C	-	-	-	-	-	-	F		
	Armature [2]	-	-	-	-	F	-	-	-	-	-	-	F		
	Gear Group [2]	-	-	-	-	F	-	-	-	-	-	-	F		
	Brush (and spring) [2]	-	-	-	-	F	-	-	-	-	-	-	F		
0306	CABLE, POWER, ELECTRICAL														
	Cable, power, electrical: No. 18 AWG stranded, 500-ft	C	C	C	C	C	-	-	C	-	-	C	-		
0307	CLIP, DETONATING CORD: M1														
	Clip, detonating cord	C	-	C	C	C	-	-	C	C	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0308	GALVANOMETER, BLASTING														
	Blasting galvanometer	C	C	C	O	C	-	-	-	-	-	O	-		
	Galvonometer battery	C	-	C	O	C	-	-	-	-	-	-	C		
0309	HOLDER, BLASTING CAP: M8														
	Holder, blasting cap	C	-	C	C	C	-	-	C	C	-	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0310	TAPE, INSULATION														
	Tape, insulation, electrical, ¾-inch wide	C	-	C	C	-	-	-	C	-	-	-	-		
0311	TEST SET, BLASTING CAP, M51														
	Blasting cap test set	C	C	C	O	C	-	-	-	-	-	-	-		
0312	TWINE														
	Twine: hemp, No. 18, 8-oz ball	C	-	C	C	-	-	-	C	-	-	-	-		
0313	SEALING COMPOUND														
	Sealing compound: blasting cap, waterproof, ½-pt can	C	-	C	C	-	-	-	C	-	-	-	-		
0314	WIRE, ELECTRICAL														
	Wire, electrical: annunciator, No. 20, AWC 200-ft coil	C	C	C	C	C	-	-	C	-	-	C	-		
	04—DEMOLITION KITS AND SETS														
0401	DEMOLITION KIT, BANGALORE TORPEDO: M1A1; M1A2														
	Loading assemblies	C	F	C	C	C	O	F	-	-	F	-	-		
	Nose sleeve	C	-	C	C	C	O	-	C	-	F	-	-		
	Connecting sleeve	C	-	C	C	C	O	-	C	-	F	-	-		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		
0402	DETONATOR KIT, CONCUSSION: M1														
	Detonator, concussion	C	C	C	C	C	O	F	C	C	F	-	-		
	Coupling base [1]	C	F	C	C	C	-	-	C	-	-	O	C		
	Salt tablets	C	-	C	C	-	-	-	C	-	-	-	C		
	Packing material	O	-	F	-	O	O	O	-	-	-	O	O		

See footnotes at end of chart.

*Section II. **MAINTENANCE ALLOCATION CHART**—Continued*

(1)	(2)	(3)												(4)	(5)
		Maintenance function													
				Service							Renovate				
Group No.	Functional Group	Inspect	Test	Unpack	Repack	Clean	Touch up	Mark	Install	Adjust	Paint	Repair	Replace	Tools and equipment	Remarks
0403	DEMOLITION EQUIPMENT SET, EXPLOSIVE INITIATING ELECTRIC AND NONELECTRIC [4]														
	Chest, demolition: engineer platoon, M1931	C	-	C	C	C	O	O	-	-	O	-	-		
	Crimper, cap: M2	C	-	C	C	C	-	-	-	-	-	-	-		
	Bag, canvas, carrying	C	-	C	C	C	-	-	-	-	-	-	-		
	Box, cap: 10-cap capacity, infantry	C	-	C	C	C	-	-	-	-	-	-	-		
	Knife, pocket	C	-	C	C	C	-	-	-	-	-	-	-		
	Pliers, lineman's	C	-	C	C	C	-	-	-	-	-	-	-		
	Reel, wire, firing, 500-ft RL-39A	C	-	C	C	C	O	-	-	C	O	F	-		
	Tape, computing: demolition charge	C	-	C	C	C	-	-	-	-	-	-	-		
	Cable, power, electrical: No. 18 AWG stranded, 500-ft	C	C	C	C	C	-	-	C	-	-	C	-		
0404	DEMOLITION SET, EXPLOSIVE INITIATING, NONELECTRIC [5]														

[1] Coupling base may be reprimed or replaced when firing device is used for training.

[2] Replacement is by cannibilization. Evacuate machine to lowest maintenance level that has available parts.

[3] Fabricate locally.

[4] Remainder of components are covered in previous portions of the MAC.

[5] All components are covered in previous portions of this MAC.

[6] Coupling body may be replaced by coupling base when device is used for training purposes.

APPENDIX D

ORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

D-1. Scope

This appendix lists repair parts and special tools required for the performance of organizational maintenance of demolition materials.

D-2. General

This appendix is divided into the following sections:

a. Repair Parts—Section II. A list of repair parts authorized for the performance of maintenance at the organizational level.

b. Special Tools and Equipment—Section III. A list of special tools and equipment authorized for the performance of maintenance at the organizational level.

D-3. Explanation of Columns

The following provides an explanation of columns in sections II and III.

a. Source, Maintenance, and Recoverability Codes (SMR).

(1) *Source code.* Indicates the selection status and source for the listed items. Source codes are:

Code	*Explanation*
PA	Item procured and stocked for anticipated or known usage.
KF	An item of a maintenance kit and not purchased separately. Maintenance kit is defined as a kit that provides an item that can be replaced at organizational maintenance level
XB	Item is not procured or stocked. If not available through salvage, requisition.

(2) *Maintenance code.* Indicates the lowest levels of maintenance authorized to use and repair support items. Capabilities of higher maintenance categories are considered equal or better. Maintenance level codes are:

Code	*Explanation*
Use—O	Support item is removed, replaced, used at the organizational level of maintenance.
Repair—O	The lowest maintenance level capable of complete repair of the support item is the organizational level.

(3) *Recoverability code.* Indicates the disposition action on unserviceable items. Items not coded are expendable. Recoverability code is:

Code	*Explanation*
O	Reparable item. When uneconomically repairable, condemn and dispose of at organizational level.
Z	Nonreparable item. When unserviceable, condemn and dispose of at the level indicated.

b. National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Description. Indicates the Federal item name and any additional description of the item required.

d. Unit of Measure. A two-character alphabetic abbreviation indicating the unit upon which the allowances are based; e.g., ft, ea, pr, etc.

e. Quantity Incorporated in Unit. Indicates the quantity of the item used with or on the equipment.

f. Illustration Number. Indicates the figure number of the illustration depicting the item.

Section II. REPAIR PARTS LIST

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(*a*) Fig. No.	(*b*) Item No.	SMR code	National stock No.	Part No.	Federal supply code for manufacturing	Description	Unit of measure	Quantity incorporated in unit
						01—DEMOLITION CHARGES		
		XBOOO	8140-00-089-8599	9227580	19203	BOX, WOOD: charge, demolition M112	ea	1
		XBOOO	8140-00-089-8600	9227581	19203	BOX, WOOD: charge, demolition: block, TNT, ½ lb.	ea	1
		XBOOO	8140-00-089-8601	8797739	19203	BOX, PACKING, AMMUNITION: charge, demolition: block, TNT.	ea	1

(1) Illustration (a) Fig. No.	(1) Illustration (b) Item No.	(2) SMR code	(3) National stock No.	(4) Part No.	(5) Federal supply code for manufacturing	(6) Description	(7) Unit of measure	(8) Quantity incorporated in unit
		XBOOO	8140-00-089-8602	9227582	19203	BOX, WOOD: charge, demolition: block, TNT, 1-lb.	ea	1
		XBOOO	8140-00-089-8610	9227589	19203	BOX, WOOD: charge, demolition: shaped, M2A3, 15-lb.	ea	1
		XBOOO	8140-00-089-8614	9227599	19203	BOX, WOOD: charge assembly, demolition: M37 and M183.	ea	1
		XBOOO	8140-00-089-8615	9227592	19203	BOX, WOOD: dynamite: military, M1	ea	1
		XBOOO	8140-00-827-6341	7549132	19203	BOX, PACKING, AMMUNITION: charge, demolition: block, M5 and M5A1.	ea	1
		XBOOO	8140-00-827-6343	7549165	19203	BOX, PACKING AMMUNITION: charge, demolition: shaped, M3 and M3A1 and charge, demolition: block M3.	ea	1
		XBOOO	8140-00-828-2960	8799362	19203	BOX, PACKING AMMUNITION: charge, demolition: block, cratering, 40-lb.	ea	1
		XBOOO	8140-00-832-0200	8861208	19203	BOX, PACKING, AMMUNITION: charge, demolition: shaped, M2A4, 15-lb.	ea	1
3-2		XBOOO	8140-00-832-0209	8876128	19203	BOX, WIREBOUND, PACKING, AMMUNITION: charge, demolition: block, M118.	ea	1
3-2		XBOOO	8140-00-832-0215	9216715	19203	BOX, WIREBOUND, PACKING, AMMUNITION: charge, demolition: roll, M186.	ea	1
		XBOOO	8140-00-198-4690	76-1-1260	19203	BOX, PACKING, AMMUNITION: charge, demolition: block, M2.	ea	1
						02—EXPLOSIVE DEMOLITION ACCESSORIES		
1-27		PAO-Z	1375-00-028-5202			PRIMER, PERCUSSION, CAP: improved No. 3	ea	1
1-27		PAO-Z	1375-00-028-5204			PRIMER, PERCUSSION, CAP: M2, for base coupling, firing device, demolition.	ea	1
		XBOOO	8140-00-089-8603	9227583	19203	BOX, WOOD: cap, blasting: electric, J2, type II, and electric, M6.	ea	1
		XBOOO	8140-00-089-8605	9227585	19203	BOX, WOOD: cap, blasting: nonelectric, J1, and nonelectric, M7.	ea	1
		XBOOO	8140-00-089-8608	9227583	19203	BOX, WOOD: destructor, explosive universal, M10.	ea	1
		XBOOO	8140-00-089-8609	9227597	19203	BOX, PACKING, AMMUNITION: firing device, demolition: M1, release-type.	ea	1
		XBOOO	8140-00-089-8612	9227598	19203	BOX, PACKING, AMMUNITION: fuse, blasting time: M700.	ea	1

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Fig. No.	(b) Item No.	SMR code	National stock No.	Part No.	Federal supply code for manufacturing	Description	Unit of measure	Quantity incorporated in unit
		XBOOO	8140-00-089-8613	9227591	19203	BOX, PACKING, AMMUNITION: cord, detonating: fuse, primacord, and dummy.	ea	1
		XBOOO	8140-00-089-8616	9227600	19203	BOX, WOOD: primer, percussion: cap, M2	ea	1
		XBOOO	8140-00-089-8618	9227601	19203	BOX, WOOD: firing device, demolition: M5, pressure-release-type	ea	1
		XBOOO	8140-00-089-8619	922754	19203	BOX, WOOD: firing device, demolition: M1, delay.	ea	1
		XBOOO	8140-00-089-8620	9227602	19203	BOX, PACKING, AMMUNITION: firing device, demolition: M3, pull-release-type.	ea	1
		XBOOO	8140-00-089-8621	227595	19203	BOX, PACKING, AMMUNITION: firing device, demolition: M1 and M1A1, pressure-type.	ea	1
		XBOOO	8140-00-089-8623	9227596	19203	BOX, WOOD: firing device, demolition: M1, pull type.	ea	1
		XBOOO		9296865	19203	BOX, WIREBOUND WOOD, AMMUNITION: firing device demo, multipurpose: M142.	ea	1
		XBOOO	8140-00-145-0085	8822125	19203	BOX, PACKING, AMMUNITION: igniter, time blasting fuse: M60 weatherproof.	ea	1
		XBOOO	8140-00-832-0196	8796675	19203	BOX, PACKING, AMMUNITION: destructor, explosive: M19.	ea	1
		XBOOO	8140-00-832-0197	8825213	19203	BOX, PACKING, AMMUNITION: detonator, percussion: M1A2, 15-sec delay, and M2A1, 8-sec delay.	ea	1
		XBOOO	8140-00-832-0199	8835011	19203	BOX, PACKING, AMMUNITION: igniter, time blasting fuse: M1.	ea	1
		XBOOO	8140-00-832-0198	8826665	19203	BOX, PACKING, AMMUNITION: coupling base, firing device.	ea	1
			....		81349	BOX, PACKING, AMMUNITION: fuse, blasting, time: (safety fuse) packed according to MIL-P-116 Method III.	ea	
		XBOOO	8140-00-198-4689	76-1-1497	19302	BOX, PACKING, AMMUNITION: igniter, time, blasting fuse: weatherproof, M2.	ea	1
						03—MISCELLANEOUS DEMOLITION ACCESSORIES (NONEXPLOSIVE)		
						0301—PRIMING ADAPTER M1A4		

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Fig. No.	(b) Item No.	SMR code	National stock No.	Part No.	Federal supply code for manufacturing	Description	Unit of measure	Quantity incorporated in unit
						0308—BLASTING GALVANOMETER		
		XBOOO	8140-00-089-8598	9227579	19203	BOX, WOOD	ea	1
		PAOOZ	6135-00-128-1632			BATTERY, SILVER CHLORIDE, DRY CELL, MIL-TYPE BA-245/u.	ea	1
		PAOOZ	6135-00-833-9909			BATTERY, SILVER CHLORIDE, DRY CELL, MIL TYPE BA-2245/u.	ea	1
						04—DEMOLITION KITS AND SETS		
		XBOOO	8140-00-857-2975	9216100	19203	BOX, PACKING, AMMUNITION: demolition kit, bangalore torpedo: M1A1 and M1A2.	ea	1
		XBOOO	8140-00-003-8118	8860563	19203	BOX, PACKING, AMMUNITION: detonator kit, concussion: M1.	ea	1

Section III. SPECIAL TOOLS

(1) Illustration		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) Fig. No.	(b) Item No.	SMR code	National stock No.	Part No.	Federal supply code for manufacturing	Description	Unit of measure	Quantity incorporated in unit
		PAO-	3540-00-665-6242			STRAPPING AND SEALING KIT:*	ea	1
		PAO- -	8135-00-281-4071	QQ-S-781		STRAPPING, STEEL: ⅝ in. x 0.023 in., 50 lb.	ea	1
		PAO- -	8135-00-239-5291			SEAL, STRAPPING		ar
		KFO- -	....			SEALER		1
		KFO- -	....			STRETCHER		1
		PAO- -	3540-00-565-6244			STRAPPING AND SEALING KIT:*		1
		PAO- -	8135-00-283-0671	QQ-S-781		STRAPPING, STEEL: 1-¼ in. x 0.035 in., 50 lb.		1
		PAO- -	8135-00-239-5294			SEAL, STRAPPING		ar
		KFO- -	....			SEALER		1
		KFO- -	....			STRETCHER		1
		PAO- -	5110-00-293-0089	GGG-S-291		SHEARS, METAL CUTTING HAND: 12-½ in.	ea	4
		PAO- -	5120-00-224-7592			PRESS, LEAD SEAL, HAND: with removable dies, US and ORD insignia die legend.	ea	4
		PAO- -	5120-00-319-5434	8864731	19203	SALLEE CLOSER	ea	1

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* One per organization.

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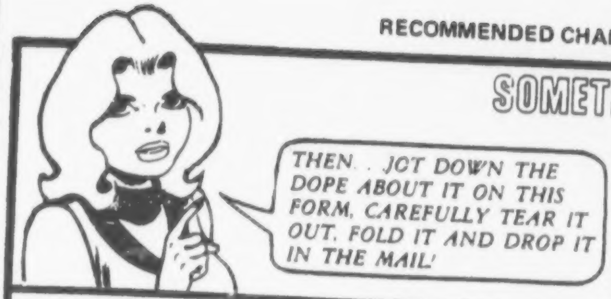
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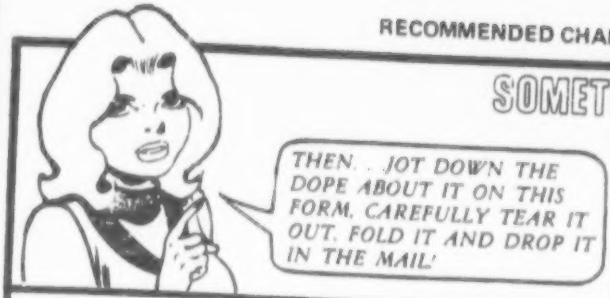
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